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The overall purpose of this study was to examine teacher candidates' perceptions toward Universal Design for Learning (UDL) in the following areas: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL. To fulfill this purpose, this study explored these perceptions of teacher candidates in special education, general curriculum major, as well as teacher candidates in the dual major in elementary education and special education: general curriculum. A total of six teacher candidates, three of them majored in the special education: general curriculum, and three others majored in the elementary education and special education: general curriculum dual major, participated in this study. Five individual interviews and one focus group interview were conducted to describe the participants' perceptions toward UDL. A series of the lesson plan reviews were conducted to describe what aspects of UDL principles teacher candidates applied to their classroom teaching practices.

Results of the individual interviews and the focus group interview were highlighted and categorized into themes based on clusters of meanings. Emerging themes from individual interviews and the focus group were (1) benefits and practicality, (2)

dedication to building UDL competency, (3) collegial support, (4) overcoming challenges, (5) advanced application, and (6) personal commitment. UDL principles included in the participants' series of lesson plans were organized into categories such as (a) representation, (b) action and expression, and (c) engagement. Emerging patterns from the lesson plan reviews were consistent with themes emerging from the individual interviews and the focus group interview.

The emerging themes suggested that teacher candidates' understanding, implementation, and application of what they learned in relation to UDL were supported by their experiences fostered by their UDL training in the program. This finding may add insight into how these teacher candidates conceptualize their understanding of UDL principles and application of these principles to their teaching experiences in the field of special education.

ACQUISITION AND APPLICATION: UNIVERSAL DESIGN FOR LEARNING
WITH TEACHER CANDIDATES IN SPECIAL EDUCATION:
GENERAL CURRICULUM AND THE DUAL MAJOR IN
ELEMENTARY EDUCATION AND SPECIAL
EDUCATION: GENERAL CURRICULUM

by

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CHAPTER I

INTRODUCTION

Statement of Problem

The latest educational data indicate that school-age children with disabilities are being given increased access to general curriculum through learning with their typically developing peers in the general education classroom (Sindelar, Shearer, Yendol-Hoppey, & Liebert, 2006). This trend is set by Individuals with Disabilities Education Act (IDEA) of 2004 and No Child Left Behind Act (NCLB) of 2001. These education policies address standard-based education through access to general education curriculum for learners with and without disabilities (Meo, 2008). In order to increase access to general education curriculum for learners with diverse learning needs, it is essential to ensure that teachers are equipped with knowledge and skills for barriers preventing learners from access to the curriculum. By applying Universal Design for Learning (UDL) principles, teachers can remove preexisting barriers in the curriculum, and bridge learners and their interaction with curriculum (Rose & Mayer, 2002; Orkwis & McLane, 1998). However, available research on UDL is limited (Edyburn, 2010), and more research on teacher training on UDL principles and its application are essential (Spooner, Baker, Harris, Ahlgrim-DeLzell, & Browder, 2007). For these reasons, research on training teachers on UDL, their understanding of UDL from the training, and their application to the real

classroom is essential for enhancing access to general education curriculum for students with varied abilities.

Purpose of the Study

The overall purpose of this study was to examine teacher candidates' perceptions toward UDL in the following areas: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL. To fulfill this purpose, this study explored these perceptions of three teacher candidates in a special education, general curriculum major, as well as three teacher candidates in a dual major in elementary education and special education: general curriculum. This study aimed to gain insight into how these teacher candidates conceptualized their understanding of UDL principles and their application of these principles to their teaching experiences.

Research Questions

This study was guided by the following research questions.

1. How do teacher candidates enrolled in the major in special education: general curriculum and the dual major in elementary education and special education: general curriculum perceive their understanding of UDL?
2. How do these teacher candidates perceive UDL implemented in classrooms through their field-based experiences?

3. How do these teacher candidates perceive their implementation and application of what they learned related to UDL to classroom teaching practices?
4. How do these teacher candidates perceive their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL?

Conceptual Framework for the Study

The conceptual framework for this study was Universal Design for Learning (UDL). UDL is a means of building-in accessible features to the curriculum in a process of its development, so that the curriculum can be developed and transformed to be accessible for a widest extent of learners as possible (Meo, 2008; Rose & Meyer, 2002). In this way, needs for adding on changes in curriculum features such as instruction, materials, and strategies can be reduced afterward (Kurtts, Matthews, & Smallwood, 2009). This conceptual framework was illustrated in Figure 1. Center for Applied Special Technology (CAST, 2014) provides three core principles of UDL: (1) multiple means of representation; (2) multiple means of action and expression; and (c) multiple means of engagement. Because individuals have varied skills, needs, and interests in relation to their learning uniquely coordinated by individuals' brain networks, each of these three core principles are derived from activating the following brain networks: (a) recognition networks making connections with the *what* of learning; (b) strategic networks making links with the *how* to learning; and (c) affective network activating the *why* to learning (CAST, 2014). By considering how the human brain works through these three brain

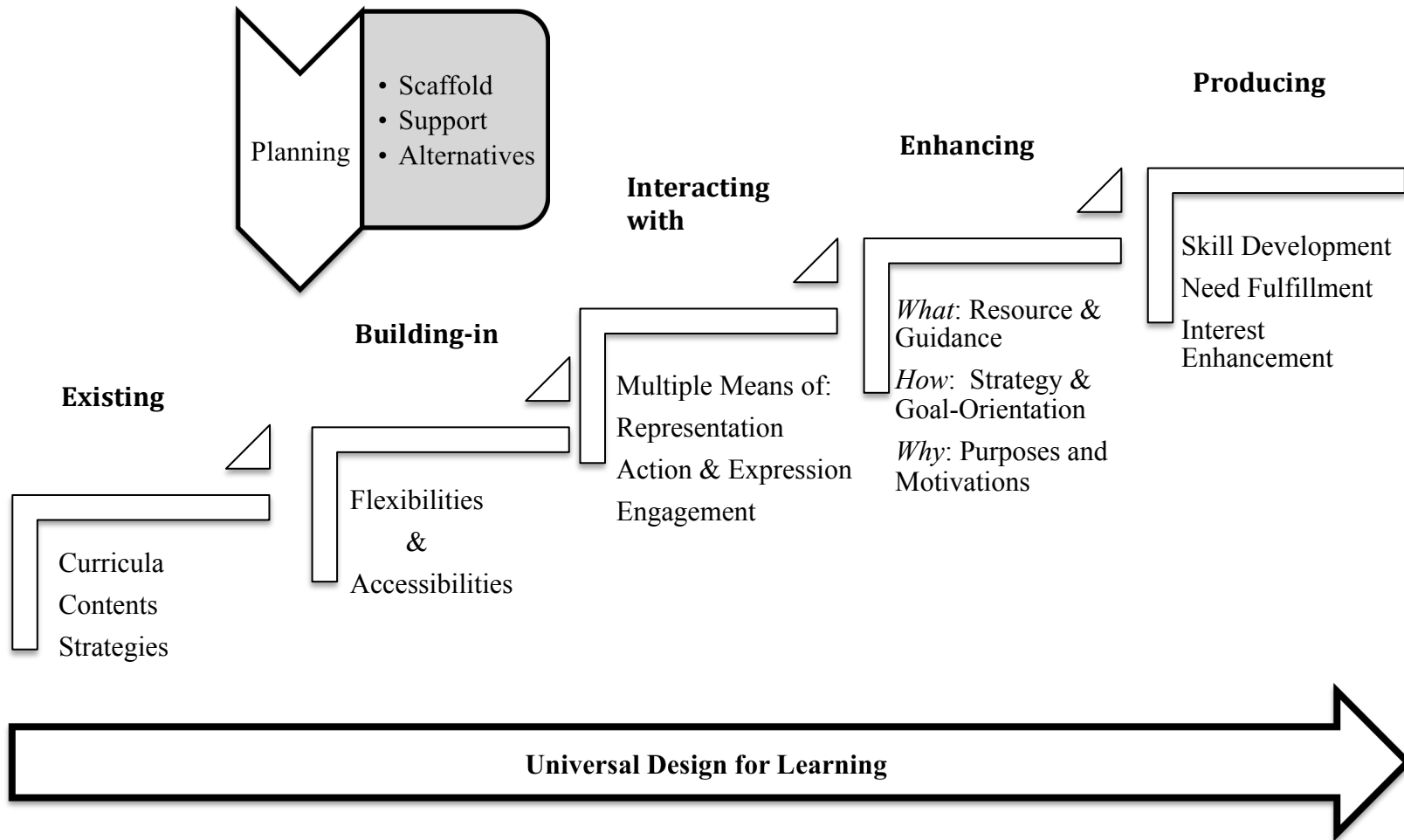


Figure 1. *Conceptual Framework for the Study*. Adapted from “Universal Design for Learning Guidelines version 2.0,” by D. Rose and J. Gravel, 2011, retrieved from <http://www.udlcenter.org/aboutudl/udlguidelines>
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networks by using UDL core principles, teachers can locate multiple modes of instructional presentation of curriculum content, help student action and expression of how they learn, as well as establish student engagement in making sense of why they learn (CAST, 2014).

This curriculum development process gives students flexible and accessible learning experiences through interaction with the curriculum (Orkwis & McLane, 1998). Therefore, a foundation of UDL is to develop curriculum through built-in features of varied representation of concepts, action and expression of what student acquire, and engagement of student motivation and challenges. In this way, students can activate their brain networks in what, how, and why to learn when they interact with the curriculum. This will reduce chances of students experiencing difficulty interacting with the curriculum due to their unique skills, needs, and interests that they utilize when they demonstrate this interactive learning (Orkwis & McLane, 1998).

Approach

This study was conducted through a phenomenological qualitative research methodology and founded upon the UDL conceptual framework. This research approach enabled the study to find out teacher candidates' perceptions toward UDL. By having teacher candidates from two teacher preparation programs, the major in special education: general curriculum, the dual major in elementary education and special education: general curriculum, a wider variety of perspectives were identified.

Phenomenological qualitative research methodology allows researchers to describe experiences shared by a group of individuals based on a phenomenon (Creswell,

2007). In this study, a phenomenon was a shared membership in teacher preparation programs at a university located in the southeastern United States. By applying the UDL conceptual framework to this phenomenological study, this study explored participants' perspectives of their (1) understanding of UDL principles; (2) experiences and observations in UDL classroom implementations; (3) practice and application of what they learned related to UDL to field-based experiences; and (4) experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges in relation to understanding and implementing UDL.

Definitions

For the purpose of this study the following definitions will be used.

Universal Design for Learning (UDL)

Universal design for learning means planning instruction and learning by developing curriculum through three core principles to meet diverse learning needs for individuals with varied abilities (CAST, 2014; Kurtts et al., 2009). It includes the following elements of teaching and learning activities: ways instructors present information; ways students can express knowledge; and ways students are engaged and motivated in learning. These elements are built into the teaching and learning activities. This approach is designed to make learning much more accessible to all students (CAST, 2014).

Typically Developing Peers

In this study context, typically developing peers indicate classmates or peers without identified disability.

Significance of the Study

The most recent reauthorizations of educational laws such as IDEA (2004), NCLB (2001), and Higher Education Opportunity Act (HEOA) of 2008 prioritizes an achievement of educational standard for all students with varied abilities (U.S. Department of Education, 2002; U.S. ED, 2010a; U.S. ED, Office of Special Education Programs, n.d.). Particularly, in IDEA (2004) and HEOA (2008), UDL is defined and mandated to be implemented in order to promote and sustain high expectations for all learners to guide their outcomes. However, a lack of research in an area of UDL (Edyburn, 2010), the challenges to adopt and apply UDL among teachers (Kouterling, McClannon, & Brazier, 2005), and the misconception of UDL and evidence-based practices (Basham & Marino, 2013; Meo, 2008) can be hazardous therefore affecting teacher instruction and student learning. To help teachers understand UDL principles and facilitate their curriculum development accessible to students with varied academic needs, it is essential to investigate teacher training on UDL principles and the application of these principles.

Delimitations and Assumptions

This study aimed to explore the following elements: the participants' (1) understanding of UDL; (2) experiences and observations in how UDL was implemented in classrooms; (3) implementation and application of what they learned related to UDL in classroom teaching practices; and (4) experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and its implementation.

Limitations of the study included the following: (a) the small sample size of the study, (b) the varied background bias of the participants, (c) the difficulty to identify causation, and (d) researcher bias. These were the challenges expected to be encountered in this study.

Small Sample Size

The small sample size of the study may highlight individual participants' unique understanding and perceptions of UDL. However, due to the small sample size, the results of this study should not be used to draw a generalization among the general population. Since the sample is selected in a particular region in the United States, the participants' cultural background also needs to be considered for collecting and interpreting data in this study. In addition, participation in this study was inconsistent among the sample. Four out of six participants engaged in all aspects of this study including individual interviews, a focus group, and lesson plan reviews. However, Participant 5 engaged in the individual interview and the focus group interview without participating in the lesson plan review due to her choice to engage in the first two elements of this study. Participant 6 engaged in a lesson plan review without participating in the individual interview and the focus group interview due to health issues at the time of this study. These elements, as a part of small sample size, need to be noted in the analysis and discussion of findings from this study.

Varied Background Among Participants

Varied backgrounds among participants can influence how they perceive their understanding of UDL principles and application of these foundations. These background

factors include but are not limited to the following components: participants' family dynamics including family members with disabilities; ages; education backgrounds; experiences in working with individuals with disabilities; characteristics of university courses of the participants' choices; and previous educational experiences utilizing particular instructional and learning strategies. In collections and analyses of the data, this study should be directed toward exploring the participants' perspectives toward their experiences in relation to UDL instead of explicating how their perspectives may be formed.

Difficulty in Identifying Causation

Conducting the self-report through the individual interviews and the focus group interview inhibits an identification of causal relationships from the study. The participants' perceptions toward UDL may be solely influenced by their background experiences or a combination of their background and engagement in teacher preparation programs. This study should address participants' understanding and perception rather than identifying causes of their particular perceptions.

Researcher Bias

Bias of the researcher needs to be addressed throughout the study. Specifically, the researcher may draw bias from the following elements: educational background in special education; experiences working with individuals with disabilities; and experiences working with college students enrolled in teacher preparation programs. This unique background can influence how questions are selected and worded, interviews are conducted, and data are interpreted and synthesized.

Summary

This study explored teacher candidates' understanding and perception of UDL. Particularly, these teacher candidates' (1) knowledge of UDL; (2) experiences and observations in UDL classroom application; (3) implementation and application of what they learned about UDL to their classroom teaching practices; and (4) experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL were examined. This chapter serves as an introduction to this study and explains the following elements: (1) statement of problem; (2) purpose of the study; (3) research questions; (4) conceptual framework for the study; (5) approach; (6) definitions; (7) significance of the study; and (8) delimitations and assumptions of the study. The statement of the problem sets the stages for the purpose of the study, research questions, conceptual framework, and approach to be implemented. Terminologies are introduced in order to clarify the elements of the study and materials used for the data collection. Identifying the significance and delimitation of the study clarifies the study's focus highlighting participants' understanding and perception of UDL. Chapter 2 will explore the topic of UDL in relation to (a) educational policies, (b) history and theory of universal design, (c) universal design for learning, (d) strategies for UDL application, (e) obstacles and challenges to application, (f) training, support, and resources for planning and implementing UDL, and (g) gaps in research.

CHAPTER II

REVIEW OF THE LITERATURE

The 21st century promotes an increasingly diverse world by providing access to multiple outlets for young people and adults to communicate with others from diverse backgrounds such as the following: age, gender, sexual orientation, gender identity, class, region, spiritual identity, national origin, religion, race, ethnicity, physical and mental ability, emotional ability, language, socioeconomic status, political perspectives, and/or unique individual style (Griffin & Jackson, 2011; Hall, 1997; Mighty, Ouellett, & Stanley, 2010). According to the new human capital theory, the outcomes of developing human capital can be directly linked to competitive economic growth; the outcomes of human performance are linked to pools of knowledge and skills, capacities of learning, and adaptabilities to cultures (Rizvi & Lingard, 2011). The diversity presented in the 21st century is appreciated and valued by businesses and societies (Rivers, 2010). For example, globalization encourages invention, reinvention, and advancement in the latest communication technologies (Rivers, 2010) through which people can communicate with others from various cultures that might otherwise be impossible. However, in every society in the world, it is inevitable that people face challenges to communicate and accept others from different linguistic, cultural, and behavioral backgrounds (Rivers, 2010). Resolving these challenges starts by increasing an awareness and understanding of diversity in societies. Both underrepresented groups of students, including students with

disabilities, as well as dominant groups of students benefit from diversity in societies.

These learners can learn from each other and broaden their perspectives by exchanging and challenging ideas (American Federation of Teachers, 2010; Shaw, 2009).

Exchanging opinions and dialogues with peers from diverse cultural backgrounds helps students their learning experiences, observations relevant to their lives (Lopez & Zúñiga, 2010). Thus, this chapter addresses the topic of teaching students with varied abilities for general curriculum through Universal Design for Learning.

Educational Policies

An underpinning of policies includes diversity in ideas, values, historical defrayal, and perspectives for the latest political possibilities (Rizvi & Lingard, 2011). Special education teachers contend with educational policies and mandates related to areas such as the following: state and local curriculum and requirements; budget and its limitations; instructional planning and agenda; and teacher-accessible resources (Basham & Marino, 2013). The historical background of these policies and mandates helps professionals in the field of education deepens their understanding of the latest transformations and dynamics in special education (Itkonen, 2007).

History of Educational Access to All Learners

Itkonen (2007) describes the process of developing PL 94-142, the Education for All Handicapped Children Act (EAHCA) of 1975, and analyzes the transformation of education that has taken place since 1975. Through this historical analysis, the author considers implications for the future of teacher education.

The advocacy of children with disabilities and their families started in the early 1970s, prior to the establishment of PL 94-142. By 1973, these advocates filed 27 court cases that were considered “right-to-education lawsuits” (Itkonen, 2007). In these court cases, the advocates made the argument that to deny educational access would be against the U.S. Constitution. In the school finance case of 1973, the Supreme Court ruled that the U.S. Constitution did not ensure a right for access to public education. The advocates in this “right-to-education” movement continued to appeal; establishing federal legislations and policies that prohibited discriminations against individuals with disabilities within federally funded programs (Itkonen, 2007). Through this advocacy movement, three acts were established in the early 1970s; the Occupational Safety and Health Act of 1970; the Child Development Act of 1971; and the Section 504 of the Vocational Rehabilitation Act of 1973. In addition, Senator Harrison Williams, as well as his staff working with the Council of Exceptional Children (CEC) and Senator Jennings Randolph, created a bill which stipulated incentives to states that provide education for individuals with disabilities (Itkonen, 2007).

There was a disagreement between advocates and educators on the bill. Advocates wanted the bill to ensure their right to a due process hearing; however, educators wanted the bill to deny the obligation of ensuring a due process hearing and individualized education program. In order to mediate this agreement through negotiations, Representative George Miller invited four directors from the CEC, The Arc, United Cerebral Palsy, and the National School Board Association to join the discussion. On November 29, 1975, the EAHCA (PL 94-142), the foundation of a free and appropriate

public education (FAPE) (U.S. ED, Office for Civil Rights, 2010), was signed and enacted by President Ford (Itkonen, 2007).

This special education policy was implemented across all 50 states by the late 1980s. After the implementation of this policy ensuring FAPE, the focus shifted to educational outcomes in the 1990s. One such example focusing on educational outcomes is the Goals 2000 enacted in 1994. This policy promoted content and performance standards in each state. Another example is the Improving America's School Act of 1994. This act required schools to plan for the assessment and achievement of both the content and performance standards when receiving Title I funds. This policy transformation represents a paradigm shift from educational access in school to what students learn once they have access to education (Itkonen, 2007).

Among this policy transformation, the general education community focused on quality and outcomes rather than access to education. The general education community focused on the quality and outcomes of education in 1995 due to the concern of funding, service delivery cost, and teacher training needs. The IDEA reauthorization in 1997 included two major changes. Going forward, statewide exams would include students with disabilities. IEP meetings would include a participation of a general education teacher. As a result, service delivery for students with disabilities increased the involvement of general education teachers (Itkonen, 2007).

Itkonen (2007) describes future teacher education in accordance with this historical policy analysis in the field of education. He states a need for the alignment of general and special teacher preparation programs in order to meet individual student

needs and academics content standards through collaborative efforts. There was a shift in special education policies from their role as a civil right to an education law (Itkonen, 2007). The proceeding section addresses the IDEA 2004 and the No Child Left Behind Act (NCLB). These policies emphasize accountabilities and standards that affect all learners including students with disabilities and their typically developing peers.

Individuals with Disabilities Education Act of 2004

Teaching school-age students with disabilities in general education classrooms has become a widespread educational practice (Sindelar, et al., 2006). The Individuals with Disabilities Education Act (IDEA) of 2004 is considered to have set this educational trend. For instance, the least restrictive environment (LRE) mandates that students with disabilities have maximum access to general curricula in inclusive settings (U.S. ED, Office of Special Education Programs n.d.). Likewise the NCLB promotes access to general education among students with disabilities as well.

No Child Left Behind Act of 2001

The No Child Left Behind (NCLB) Act of 2001 (PL 107-110) ensures that all children have a fair, equal, and significant opportunity to receive a high-quality education. This law also mandates that state standards be met by all students with at least minimum proficiency on academic achievement tests and assessments (U.S. ED, 2002). The NCLB also holds teachers accountable for the learning outcomes of students. Parental involvement in their children's education is ensured by the NCLB as well. Another requirement of the NCLB is to implement a comprehensive needs assessment and service delivery plan for migratory students from diverse cultural backgrounds in

order to identify and address their needs in special education. (Sec. 1306). A support system to encourage the continuing education for at-risk students, including those who are neglected or delinquent, is ensured by this mandate (Sec. 1401).

A blueprint for reform: The reauthorization of the Elementary and Secondary Education Act (U.S. ED, 2010a) states that every student should be prepared to attend postsecondary education or ready to establish a career after graduation from high school regardless of their backgrounds such as disabilities, socioeconomic status, language, race, or ethnicity. In order to achieve this goal, graduating from a secondary school and transitioning to adulthood require students to have access to general education curriculum and demonstrate its mastery through content standards in state assessments.

Both IDEA (2004) and NCLB (2001) promote a high-quality and standard based education for all school-age children, including students with disabilities or diverse cultural background and their typically developing peers. However, these laws do not support flexibilities in the curriculum that support improved academic outcomes of students with diverse learning needs (Meo, 2008). In a response to this necessity in the curriculum flexibilities, the ESCEA Blue Print for Reform (U.S. ED, 2010a) addresses an enhancement of flexibilities in the educational reform.

Providing education for all students with and without disabilities can be achieved by implementing Universal Design for Learning (UDL) which removes barriers to learning accessibilities through built-in environments that benefit all learners (CAST, 2014). This concept, UDL, is derived from the principles of Universal Design (UD) that direct a logical product development approach for physically constructing more

marketable products for consumers (McGuire, Scott, & Shaw, 2006). The UDL framework can bridge general and special education for delivering general education curriculum for students with and without disabilities (Courey, Tappe, Siker, & LePage, 2012).

History and Theory of Universal Design

Universal Design for Learning (UDL) was established upon an architectural concept of Universal Design (Rose & Meyer, 2002, 2006). The term, *Universal Design* (UD), was formed by Ronald L. Mace, an architect, product designer, educator, and advocate for the rights of individuals with disabilities, who challenged conventional design to advance a world to be more usable (The Center for Universal Design, College of Design, North Carolina State University, 2008). He was a founder and program director of the Center for Universal Design at North Carolina State University. In 1988, he defined the term UD to describe the concept of product designs and built environment as appealing and practical for as extensive as possible for individuals with varied ages, abilities, and life status (CAST, 2015; The Center for Universal Design, College of Design, North Carolina State University, 2008).

UD products and environments have become more commonly available. For instance, captioning on the television screen can help individuals with hard-of-hearing and others in noisy environments such as restaurants and airports; curb cuts can be used by people in a wheelchair or on skateboard, pushing a stroller, and using a rolling cart; and universal symbols can facilitate an understanding of meaning for individuals with difficulty reading, non-English speakers, and prereading children (Burgstahler, 2012;

McGuire et al., 2006). The principles of UD are established by Connell et al. (1997) and composed with the following elements: (1) equitable use; (2) flexibility in use; (3) simple and intuitive use; (4) perceptible information; (5) tolerance for error; (6) low physical effort; (7) size and space for approach and use. These components are also the foundations of UDL. As UD become more available in surrounding environments, UDL appears to become more available in educational environments as well.

Anne Meyer, David Rose, Grace Meo, Skip Stahl, and Linda Mensing formed the Center Applied Special Technology (CAST), a not-for-profit organization in 1984 (CAST, 2015). In that same year, CAST was founded with a focus on promoting learning for students with learning disabilities through technology (CAST, 2015). In 1988, CAST established a new focus on rearranging and making changes in the curriculum rather than dealing with individual learners' needs, and this new focus became a foundation for UDL. In nearly three decades after the formation of these UDL principles, the concept of UDL has been refined, revolved, and reexamined by educators and researchers (CAST, 2015). There are numerous similar terminologies to UDL such as universal design for instruction, universal instructional design, and universal design for education (McGuire et al., 2006); however, since they share a concept of developing instruction accessible to students with varied abilities, the term UDL will be used throughout the following chapters.

Universal Design for Learning

Universal Design for Learning (UDL) has become a popular educational term in the 21st century. UDL means planning teaching and learning strategies to meet the needs

of a broader population of students with varied learning styles and abilities without adding-on accommodations or modifications (Kurtts et al., 2009; Pisha & Coyne, 2001). This is more efficient and economical because it reaches a wider market of learners (Orkwis & McLane, 1998). Since UDL aims to provide learning environments functional for the most extensive number of learners possible, the needs for individualizing these environments can be minimized (Curry, Cohen, & Lightbody, 2006). In this section, the following concepts are discussed: (a) rationales for UDL classroom application; (b) benefits of UDL application; (c) IDEA 2004 and UDL; (d) No Child Left Behind and UDL; (e) Higher Education Opportunity Act of 2008 and UDL; and concepts of UDL principles.

Rationales for UDL Classroom Application

UD aims to increase flexibility and accessibility so that everyone, even those who are not targeted users, can ultimately benefit from its features (Meo, 2008). UDL keeps the same foundation as UD and targets diverse learners in flexible manners. UDL includes the following elements of teaching and learning activities: ways instructors present information; ways students can express knowledge; and ways students are engaged and motivated in learning (CAST, 2014). These elements are built into teaching and learning activities through scaffolds, support, and alternatives for a broader range of learners (Meo, 2008). This approach makes the content, curriculum, and strategies to learn more accessible to all students (CAST, 2014).

Benefits of UDL Application

Access to general education curriculum is a key in IDEA 2004 (U.S. ED, n.d.; U.S. ED, Office of Special Education Programs, n.d.) and UDL (CAST, 2014). However, the phrase, *access to general education curriculum*, can be ambiguous. Orkwis and McLane (1998) describe access to the curriculum for students as being able to interact with the curriculum and learn from it. This interaction with the curriculum can be an obstacle for students with disabilities due to their physical, sensory, or cognitive challenges. Therefore, the barriers preventing interaction and access to the curriculum need to be removed (Orkwis & McLane, 1998). Because of its flexibility of instructional representation, learning action and expression, and student engagement, the UDL lesson engages all students in a shared learning natural environment to meet curriculum goals in content areas (Gavigan & Kurtts, 2009; Orkwis, 2003). UDL can be a powerful tool to teach academic and social skills when it is integrated into Explicit Instruction (Hall & Vue, 2014) and Differentiated Instruction (Hall, Vue, Strangman, & Meyer, 2014) models.

IDEA 2004 and UDL

IDEA 2004 addresses implementations of assistive technology with UDL principles to enhance accessibility of general education curriculum as a requirement (U.S. ED, Office of Special Education Programs, n.d.). This law defines ‘universal design’ indicated in the term in section 3 of the Assistive Technology Act of 1998 (29 U.S.C. §3002) (U.S. ED, Office of Special Education Programs, n.d.) as the following:

The term 'universal design' means a concept or philosophy for designing and delivering products and services that are usable by people with the widest possible range of functional capabilities, which include products and services that are directly accessible (without requiring assistive technologies) and products and services that are interoperable with assistive technologies. (U.S. General Services Administration, Office of Government Policy, n.d., 29 U.S.C. §3002).

The National Instructional Materials Accessibility Standards is a part of IDEA 2004 and its standard application influences publishers to provide textbooks and printed materials accessibly and digitally (CAST, 2013 b; Curry et al., 2006).

No Child Left Behind and UDL

CAST (2011) describes how UDL can be aligned with the central principles of NCLB. For instance, UDL can be used to guide progress monitoring and assessments in the curriculum that reflect upon instruction for all students. This means more accurate and timely outcomes of instruction and students can be observed. Flexibilities of UDL also support the curriculum development that encompasses high expectations and motivational choices. Lastly, educators can use research-based teaching practices embedded in a process of the curriculum development to teach all students with and without disabilities. By finding ways to concretely define and measure UDL implementation that distinguish implementation and non-implementation of UDL, (Edyburn, 2010), an application of UDL can be proven as an addendum to the main focus of NCLB.

Higher Education Opportunity Act of 2008 and UDL

The Higher Education Opportunity Act (HEOA) (PL 110-315) is enacted in 2008 and includes a criteria for establishing high-quality, inclusive, and comprehensive

transition and postsecondary programs for individuals with disabilities (U.S. ED, 2010b). The HEOA defines UDL as a research-based framework that provides flexibilities in presenting information, demonstrating knowledge and skills, and engaging tasks; and reduces barriers existing in instruction, provides appropriate accommodations, support, and challenges, as well as promotes high expectations for every learner with and without disabilities and English language proficiencies (U.S. ED, 2010b).

Concepts of UDL Principles

CAST (2014) defines UDL as a set of curriculum development principles that promote equal learning opportunities for all individuals. CAST divides a curriculum development into four elements: forming instructional goals, methods, materials, and assessment in flexible and approachable manners which are customizable and adjustable according to learning needs of all individuals (CAST, 2014). This is different from a one-size fits-all approach (CAST, 2014; Jiménez, Graf, & Rose, 2007; Meo, 2008).

Connecting with research on brain networks. Based on neuroscience research and considering individuals' varied learning skills, needs, and interests, UDL addresses three brain functions: recognition networks for identifying what to learn; strategic networks identifying how to learn; and affective networks identifying why to learn (CAST, 2014). For making a processing connection between learning actions and these brain networks, CAST (2014) recommends three UDL principles: (1) multiple means of representation through differentiating presentations of information in perception, expressive and symbolic language, and comprehension; (2) multiple means of action and expression through differentiating opportunities to express what students know in

physical action, expression, communication, and executive function; and (3) multiple means of engagement through encouraging learning interest and motivation in highlighting interest, maintaining effort and persistency, and self-regulation.

Strategies for UDL Application

There are instructional strategies founded upon principles of UDL that special and general education teachers can apply to their classrooms. In the subsequent section, the following topics are discussed: (a) adapting an idea of UDL application and its use of technology, (b) incorporating UDL into Response to Intervention (RtI), and (c) an example of high technology.

For some teachers, the cost of technology can be a concern when they conceptualize an application of UDL principles. UDL principles may appear in a way that its implementation requires both knowledge and the use of technology however, teachers do not necessarily have to utilize expensive technology to apply UDL principles (Spooner et al., 2007). In fact, UDL is not simply utilizing the latest technology for the implementation of curriculum (Edyburn, 2010). A variety of materials providing auditory, visual, and tactile stimulus can enhance opportunities for students to engage with information such as music, movement, and dance (Stockall, Dennis, & Miller, 2012). Enhancing opportunities for students to learn may not necessarily require costly technology. Spooner et al. (2007) point out that general and special education teachers can apply UDL principles without utilizing expensive technology by non-traditional instructional methods incorporating real life problem-solving applications. They further provide examples of strategies to engage students with disabilities in lessons such as

working with cooperative groups, drawing or painting sequenced steps, summarizing information by making up a song, and conducting science experiments. The authors note that it is essential to provide students with problem-solving opportunities so that they can picture a big idea of objectives without being overwhelmed. In addition, varied sensory modalities, flexible groupings, and instructional pacing adjustment are keys to increasing accessibility of the curriculum (Courey et al., 2012). Courey et al. (2012) also provides examples of materials that can be used in UDL lessons such as PowerPoint®, graphic organizers, audio equipment, three dimensional models, manipulatives, guided notes, peer tutoring, and web-based activities.

Basham, Israel, Graden, Poth, and Winston (2010) point out that there is a common feature between UDL and RtI. For instance, both instructional principals include multiple means and tiers of instructional practices. They also note that both of these approaches are founded upon an ecological framework focusing on preventions and removals of barriers through uses of research based strategies. The nature of UDL includes proactive design, differentiated strategies, and practical technology. Due to this nature, incorporating UDL into each tier in RtI will create a foundation of its learning environment, enhance staple instructional practices, and help students acquire specific knowledge as well as big ideas.

The authors also note the importance of student and ecological data collected from formative assessments for identification of ecological influence on student performance. With a partnership between Cincinnati Public Schools (CPS) and University of Cincinnati, the authors provided training modules and strategies to CPS

teachers in the 2010-2011 school year. The authors plan to report results of this training and investigation of the UDL and RtI integration. The application of UDL principles are suggested helping teachers consider all students who learn in the same classroom but receive different tiered instructions in the RtI model. This is also considered to assist teachers in identifying ecological factors such as curriculum and instructional methods that affect student understanding and performance of contents.

Sapp (2009) describes accessibility and practicality of the Universal eLearner©, a piloted online learning module which incorporates the UDL approach into its accessibility, as a similar teaching strategy to tiered differentiated instruction. The Universal eLearner© is equipped with two tiers of captioning systems: standard captioning following narratives and dialogues, and concise captioning displaying simplified narratives and dialogues with adjustments made for readability. In addition, two tiers of audio descriptions (standard audio description with key descriptors on the screen and expanded audio description with supplemental information) are equipped with the Universal eLearner©. Closed captioning and audio descriptions displaying narration of visual elements benefit not only individuals with hard of hearing or visual impairments but also other learners as they have more opportunities to receive and process information from these sources (Curry et al., 2006). These are examples of tiers of support built-in instructional materials.

Obstacles and Challenges to Application

Although UDL can be a powerful tool to preaddress individuals' diverse learning needs in curriculum and make the curriculum more accessible to a wider range of

students (Meo, 2008), there are obstacles and challenges that may prevent teachers from implementing and facilitating UDL application. Since UDL principles encourage teachers to rethink curriculum access and student success, teachers may become unenthusiastic to refine and adapt their teaching styles (Kouterling et al., 2005). Challenges to adopting the concept of UDL and altering to traditional curriculum design are explored in the sections that follow.

Challenges to Adopting a Concept of UDL

Meo (2008) points out that dividing students into two groups, general education and special education, oversimplifies diversity in students' learning differences. This oversimplification may result in an underappreciation of learning differences among students (Meo, 2008). In this case, UDL can help teachers look into individual learning differences beyond a categorization of student subgroups. Rose and Meyer (2002) point out the following UDL concept: challenges to learning occur in interactions with curriculum and are not solely in the learner capacity. It may sound difficult to implement UDL in a classroom and that would be true if classroom instruction were guided by the following: vague academic goals, conventional teaching methods, traditional learning materials such as books and pencils, and inflexible classroom assessments such as written tests (Meo, 2008). For this reason, attention to a responsibility of instructional adaptations needs to be directed toward curriculum and not learners when education fails (Rose & Mayer, 2002).

Traditional Curriculum Design

In standard-based educational curriculum and settings, it is essential to examine how curriculum can be designed to include a consideration for all learners from the beginning by identifying curriculum barriers and academic support for students with varied learning background (Meo, 2008). Meo (2008) emphasizes an importance of recognizing that the word “universal” in UDL does not imply that a UDL lesson works for all learners, because it is not a one-size-fits-all approach. By going back to the roots of UD, architects and designers create UD products that are accessible to the widest range of users possible, and do not make a statement of creating UD products that are totally inclusive and accessible to all consumers (McGuire et al., 2006). Also, even scientifically based practices will not deliver the desired results at times (Basham & Marino, 2013). Therefore, a UDL lesson implementation needs to accompany an assessment to evaluate whether or not the lesson was successful for students. If the lesson was not successful, teachers need to refine the lesson plan by reidentifying and reducing barriers in the lesson. This is the process for looking into supporting evidence showing rationales for unsuccessful results and using the evidence in order to continue moving forward with the next design solution (Basham & Marino, 2013). It is critical to endeavor to improve educational strategies, curriculum, and assessment as inclusively as possible to a greatest extensive number of students; however, it also is important to understand there will still be some students who need individualized educational services and support (Burgstahler, 2012; McGuire et al., 2006).

Sapp (2009) describes challenges in providing access to general education curriculum to all students with varied abilities. For instance, he points out that traditionally designed instructional materials target typically developing students. In addition, instructional materials that target particular areas of student needs may not match with the content area. In either case, it is costly to make add-on changes to these instructional materials for fulfilling the needs of diverse learners. He further states that making the curriculum accessible does not automatically result in student understanding in the curriculum. When making sure that students understand the curriculum, it is essential to implement a progress-monitoring process along with UDL.

Training, Support, and Resources for Planning and Implementing UDL

UDL is not a new concept from a historical perspective. In accordance with Orkwis and McLane (1998), the ERIC/OSEP Special Project organized a stakeholder meeting on universal design in 1997. In this meeting, a group of researchers and developers recommended teacher training programs prepare educators and teacher candidates to teach in universally designed learning environments equipped with UD(L) goals, methods, and materials (Orkwis & McLane, 1998). Nearly two decades later, this recommendation is not decayed in the current education field. In order for teachers to comprehensively and effectively implement UDL, it is critical that these teachers receive training when they enroll in teacher preparation programs (Basham et al., 2010; McGuire-Schwartz & Arndt, 2007; Strobel, Arthanat, Bauer, & Flagg, 2007). In this way, the need for professional development for teachers can be reduced without them having

to catch up with other teachers who implement UDL in their classrooms (Basham et al., 2010). Research on the application of UDL is discussed in the next section.

Research on UDL

McGuire et al. (2006) point out that the ideal of UD has been going through a developmental process and involves significant research for claiming its merit. They also note that before it is widely used, UD implementation and evaluation through research projects need to occur, and this can support a development of an effectiveness-proven model. Edyburn (2010) describes there is limited research on UDL. The following sections show emerging research on UDL in Pre-K through 12 education.

Student Perceptions of UDL in Algebra and Biology Classrooms

Kourtering et al. (2005) conducted research on examining student perception toward algebra and biology classes that integrate UDL into instruction. Participants included 320 students enrolled in two high schools in North Carolina, and their six algebra and five biology teachers. Among the student participants, 18 students were identified as having learning disabilities, 6 students were identified as having behavior disorders, 4 students were identified as having intellectual and developmental disabilities, and 12 students were identified as having attention-deficit disorder.

Through a federal UDL training grant, the teachers participated in two to four full-day training sessions on UDL. The contents of the training included uses of instructional technological tools and online resources as well as developing UDL interventions as groups of teachers. Frequency of implementing UDL interventions varied among teacher participants, as many as six times to as few as none. Therefore,

frequencies of students' exposures to UDL intervention also varied from six to zero times. A Likert-scale and open-ended survey was completed by student participants at the end of each class with UDL intervention. At the end of the year, these student responses in algebra and science were distributed to assigned teachers.

The result showed that these students reported higher levels of effectiveness, utility, and satisfaction with UDL intervention when compared to other classes in which they were enrolled. Students in both in algebra and science UDL intervention classes also reported that they felt strongly about their performance in terms of learning important and useful information, keeping on task, and working hard. Overall, students with and without disabilities favored UDL interventions. More than 90% of student participants also reported they would want to continue to receive UDL interventions.

The Context of UDL and Student Perceptions

Abell, Jung, and Taylor (2011) studied the context of UDL in the instructional environment and classrooms by exploring perceptions of 867 students in Grades 5-12 since previous research in this area showed that students' perceptions of learning environments affected how they actually learned. This quantitative study is unique in terms of its investigation into the context of UDL in different grade levels and teacher gender. By adapting the Individualised Classroom Environment Questionnaire, five variables in classroom environment were investigated: (1) personalization; (2) learner participation; (3) independent decision-making; (4) investigative problem-solving; and (5) differentiation. The participants were recruited from three schools. The students shared their perceptions of their classroom teachers and learning environments. There

was a total of 15 teachers of these participant students. Five of these teachers had more than five-years teaching experience, and ten of these teachers had more than ten-years teaching experience.

The researchers found that high school students rated higher scores on Personalisation of instruction and learning environment than upper elementary or middle school students. There was no group difference between upper elementary or middle school students in relation to Personalisation scores. In addition, high school students perceived more personalisation in instruction and learning environment provided by female teachers. In the Participation scale, high school students had higher scores than students in other grade levels. This study examined student perceptions toward inclusive practices without an exploration of actual UDL implementation in these students' classrooms. However, this study also provides an idea of how classroom environment related to UDL can be evaluated from student perspectives.

Three Block Model of UDL

Katz (2013) examined the effectiveness of the Three Block Model of Universal Design for Learning on students' academic and social engagement. This mixed method study employed a quasi-experimental and pretest-posttest design in order to observe the program effect. Participants in this study include 631 students with and without mild to moderate disabilities in general education classrooms from Grades 1 through 12, and 48 educators in Manitoba, Canada. The participants were recruited from ten schools, and these schools located in one of two rural and three urban schools. All of these

participating schools listed providing professional development on UDL as their school goal priority.

These forty-eight educators including general education teachers, resource teachers, and school administrators in the participant schools were provided a one-day workshop on the Three Block Model of UDL. Their educational experiences ranged from 3 to 36 years. Teachers who were interested in participating in the subsequent professional development opportunities and implementing this UDL model in their classrooms were identified as the treatment group. For the treatment group, three half-days of professional development on this topic on the Three Block Model of UDL and its implementation were provided.

The Three Block Model of UDL is a trifold process. The first block in this program model addresses Social and Emotional Learning for building educational communities through the Respecting Diversity program. The Respecting Diversity program encourages students to develop goal-setting and planning, self-concept, sense of belonging, and leadership skills. The first block also includes the topic of democratic classroom management, which encourages student engagement, ownership, collective problem-solving, and empowerment. The second block is the Inclusive Instructional Practice that shows an outline of a step-by-step planning process and instructional design framework through evidence-based practices provided in professional training. The third block helps educators consider systems and structures for facilitating access to general education curriculum for students through professional development, distributed leadership, and staff support.

Implementing this UDL model required teachers to co-plan a unit with their colleagues, create inquiry-based projects, develop activities through differentiations in their complexities and modalities, and construct rubrics with differentiated assessments. Teachers also shared the contents of student learning with other classes and addressed these contents in their own so that students could make connections between what they learned across curricula.

Classroom observations were conducted with 94 students (two students per classroom) for the purpose of identifying the following types of elements: tasks given (e.g., traditional instruction, differentiated instruction, or media instruction), behaviors exhibited (e.g., students' active, passive, or no engagement behaviors), and student interactions demonstrated (e.g., with peers, adults, or no one). These elements were observed in the classrooms by using a one-minute time sampling procedure with two 30-minute periods on separate days. Student surveys were implemented by reading aloud for students in pre and during intervention, except from first grade students since they were beginning readers. Thus, observations without student surveys were conducted with first graders.

The researcher found that the treatment group showed more engagement in classroom instruction than the control group. After the intervention, the treatment group showed increased differentiated learning tasks and a smaller number of pencil and paper tasks and transition time. Also, the treatment group increased small group instruction and decreased whole class instructional time. However, the control group had more time spent with whole class and independent instruction. This might be one of reasons students

in the treatment group showed more active engagement, and the control group showed passive engagement (e.g., listening to a lecture or viewing a film) and no engagement behaviors.

It is interesting to note that the researcher also found that students in higher grades had more time spent on passive engagement. This means that the higher the grade levels, the more whole group instruction and lectures might have had implemented. This seemed to have resulted in students' passive engagement in instruction. Overall, teachers with additional UDL training appeared to provide engaging lessons through the Three Block Model of UDL, and students provided with UDL instruction seemed to be more engaged in lessons.

Planning for All Learners (PAL)

Meo (2008), one of members who formed the Center for Applied Special Education Technology (CAST) and a director of professional development and outreach services at the CAST, shows a practicality of the Planning for All Learners (PAL) process. PAL is a four-step UDL planning and implementation process. This four-step process was developed to help teachers apply UDL principles to teaching content areas for diverse learners. The PAL process is designed to be implemented by teams of educators consisting of general education and special education teachers as well as curriculum or instructional specialists. The PAL team coordinates areas of curricula such as goals, methods, materials, and assessments.

The PAL process includes (1) setting goals, (2) analyzing current teaching methods, materials, assessments, and barriers, (3) applying UDL materials and methods

to lesson planning, and (4) teaching UDL lesson, assessing lesson outcomes, and making a lesson or unit plan revision if needed.

The PAL follows the following process:

1. Goal setting includes establishing contexts and topics of lessons or units as well as aligning these contexts to state and content standards.
2. Analyzing instructional status involves identifying currently implemented instructional methods, assessment, and materials. It also includes analyzing their existing barriers to access, participation, and progress.
3. The team writes UDL lesson or unit plans by identifying methods, assessments, and materials according to UDL principles, goals set in the first step, and barriers identified in the second step.
4. Created lesson or unit plans are taught by general and special education teachers in the team, lesson outcomes are evaluated, and lessons or units taught are revised if necessary.

When the lesson plans or unit plans are successful for students, the team goes back to the first step of the PAL process for another lesson plan or unit plan. If the lesson it is not successful, the PAL goes back to the previous steps to reduce barriers.

Meo (2008) describes an 18-month professional development project conducted by CAST for 12 teachers in high school content areas and special education. This professional development focused on planning and implementing instruction on vocabulary and reading comprehension in high school content areas by using UDL principles and research-based reading comprehension instructional methods. In this

project, the participants were also provided UDL principles and research-based reading instructional methods. In focus group interviews, participants reported they realized that barriers within curriculum needed to be focused and removed rather than attempting to place blame of an unsuccessful learning experience on students. The participants also reported that they felt joint-curriculum planning with general and special education teachers was beneficial as they appreciated each other's contributions to lesson and unit planning. Overall, participants showed enhanced incorporation of UDL principles and strategies into their teaching through this project.

Training Effects of UDL on Teachers and Teacher Candidates

Spooner et al. (2007) conducted experimental research on examining the effectiveness of UDL training for practicing teachers and teacher candidates. Participants included 72 graduate and undergraduate students enrolled in two special education and two general education classes, who were either practicing teachers or teacher candidates at a southeastern university. A random assignment was implemented to divide the participants into the control group and the treatment group. The treatment group received an intervention consisting of a one-hour lecture on UDL before the control group arrived at classroom. This treatment was implemented by one of the co-investigators, and the training was videotaped. Later, the control group in three selected graduate and undergraduate classes received a UDL lesson from their instructors, and the control group in another class watched a videotape of the treatment group's UDL lecture.

The one-hour UDL lecture was presented on the topic of how to transform lesson plans for teaching students with mild to severe disabilities by utilizing the following three

UDL principles proposed by CAST: multiple means of representation, action and expression, and engagement. Also, examples of including students with disabilities in the general curriculum was provided to the participants through a case study, state competencies, and curriculum goals in math, language arts, and science. Participants were also provided examples of instructional strategies for modifying instruction and books. As a pretest, the participants developed a lesson plan incorporating the three UDL principles by working with the presenter and the pretest case study. After the one-hour UDL intervention, the participants were given 20 minutes to develop a lesson plan by using a posttest case study. The lesson plan form used for this study included the following components: objective, materials, procedure, guided practice, independent practice, and assessment. In addition to these components, the lesson plan form included a section explaining and providing examples as to how these three UDL principles were incorporated into a lesson.

A maximum of six points was assigned to the scoring rubric for the pretest and posttest. The treatment group showed a gain between the pretest and posttest, while the performance of the control group stayed the same. There was no group difference between general education teachers and teacher candidates in comparison to special education teachers and teacher candidates.

As a result, the researchers indicated that training on UDL is essential for teachers to teach students across learning environments. The researchers also noted that developing lesson plans with built-in universally designed concepts may save time since teachers may not need to spend time changing a lesson after all. They concluded that

UDL training, on its concepts and application, can help general and special education teachers and teacher candidates develop skills to consider curriculum access for all students when planning lessons.

UDL Training on Lesson Planning in General Education Settings

Courey et al. (2012) conducted research on the effectiveness of UDL training on lesson planning. These researchers designed the study based on previous research conducted by Spooner et al. (2007). Participants in this study included 45 graduate students who were working toward special education certification in the department of special education in an urban university in northern California. Most participants did not have any teaching experience, and an average teaching experience among the participants was 1.3 years. In this study, Courey and her colleagues (2012) implemented a three-hour training session for all 45 graduate student participants by utilizing a UDL module developed by the IRIS Center for Training Enhancements (The IRIS Center Peabody College Vanderbilt University, n.d.) and guided notes created by the researchers.

In this training module, UDL principles were modeled in videos. Strategies to overcome typical barriers presented in the traditional general education curriculum were also provided. When the researcher presented this content, she also modeled UDL principles by utilizing the IRIS module (The IRIS Center Peabody College Vanderbilt University, n.d.) and guided notes. In addition, the participants were provided with a list of resources from CAST and the ACCESS Center on UDL. The training emphasized the need to address a learning objective throughout materials, methods, and assessments in a lesson plan. The participants were asked to create three lesson plans for a pretest prior to

the training, a posttest right after the training, and a third lesson plan at the end of the semester. The third lesson plan was examined in order to identify participants' acquisition of UDL principles and maintenance of this acquisition. Two case studies for the pretest and posttest (one for each) included students with learning disabilities and IEP goals. The third case study, situated in a general education setting for the final lesson plan, was created by the participants. The lesson plan form used for this study included the following elements: student background information and concerns; IEP goals; lesson objectives; content standards; materials specifically used for representation, action and expression, and engagement; references for evidence-based teaching resources; lesson format; introduction (anticipatory set); body (modeling, guided practice, and independent practice); closure; evaluation; and modification and adaptations.

The researchers utilized the scoring rubric created by Spooner et al. (2007). Thus, a maximum of six points was assigned to the scoring rubric to evaluate the application of UDL principles when designing a lesson plan. After the scoring, the lesson plans were examined for the observation of details in order to find areas of strengths and needed improvements. These details include the use of materials, methods, and assessments derived from the UDL framework to meet the learning objective of the lesson.

The researchers' findings indicated the participants' incorporation of UDL principles improved between the pretest and the posttest. There was a medium effect size showing a prolonged influence of the three-hour training on the participants' UDL principal application in lesson planning. Thus, the researchers concluded the three-hour UDL training was effective for the participants' UDL lesson planning. Their observations

described that the participants had difficulty creating UDL lesson plans in a cohesive manner. For example, most participants showed a tendency to use paper and pencil worksheets and dry erase boards for assessments. For this reason, the researchers concluded that UDL trainees would need more opportunities to practice in UDL lesson planning.

UDL Application Among Teacher Candidates in Pre-K through Grade 3

McGuire-Schwartz and Arndt (2007) conducted a mixed method study examining the understanding and application of UDL principles in lesson plan development among teacher candidates in Pre-K through Grade 3. The study focus examined how these teacher candidates understood and utilized the principles of UDL in lesson plan development and teaching practices in urban and suburban schools. The participants in Study One included 36 undergraduate teacher candidates with foundational knowledge of action research.

Study One was conducted during the fall and spring semesters. Prior to their participation in this study, the participants were taught topics of UDL in courses such as math and reading methods, disabilities and young children, and educational foundations. The participants enrolled in the prepracticum in the fall semester and student teaching in the spring semester. Through the prepracticum, they observed the students and teachers, with whom they would be working, during the spring semester. They also identified a problem to be resolved, wrote a literature review, developed an intervention strategy by applying UDL principles, and planned for data collection for an action research project. At the end of student teaching, the participants presented their action research data in a

poster session. Their data collection included checklists, observations, pretests and posttests, student samples, and portfolios. The participants presented their findings and wrote papers on their action research projects. Reflections written by the participants were coded by the researchers and themes were identified.

Study Two included five teacher candidates who enrolled in their first practicum experience. Thus, this study was conducted in one fall semester. Their practicum experiences included weekly lesson planning and implementation of a six-week related unit at an afterschool program located in an urban-ring school. The principles of UDL were presented by the researcher teaching the participants' initial methods class in the elementary education department. Individual interviews and focus group interviews were conducted in order to explore (a) the participants' understanding of UDL principles and (b) their lesson planning for accessibility, flexibility, and engagement of learners. A Likert Scale questionnaire was also implemented in Study Two. These five participants were trained in UDL principles' application in order to plan lessons and units in their practicum experience while working with students. The participants were also prepared for using the UDL principles by exploring online resources such as the CAST website, software, and articles. They were provided consultations with the researcher, if needed, for discussion of their questions and concerns. Through this study, the participants shared potential barriers in lesson methods and materials.

Data were collected from both Study One and Study Two. Study One data included the participants' action research results, reflective papers, poster presentations, researcher notes, and member checks. Study Two data included individual interviews,

two focus group interviews, questionnaires, surveys, lesson plan reviews, document analyses, researcher notes, and member checks. Since Study One included student teachers and Study Two included teacher candidates in their early field-based experiences, this study examined teacher candidates' perspectives within cohorts at the beginning and end of the teacher education program.

The researchers described the following findings from Study One and Study Two. For example, student teachers in Study One shared their experiences in action research. They expressed that their action research project on the application of UDL was beneficial despite the limited time frame. They stated that they would implement their intervention in the action research project for their first teaching job by keeping their format or making changes in their design. In Study Two, teacher candidates in their early field-based experiences shared that they observed the influence of UDL principles and practices on engagement and learning behaviors among students. It was found in lesson plan reviews the participants highlighted learner differences through UDL principles. The participants felt UDL tools and resources were practical for lesson planning. They also agreed that UDL lessons with multiple instructional approaches met the needs of students with and without disabilities, therefore, making education more effective. They believed students learned effectively with a variety of instruction. Additionally, these participants discovered how to meet diverse learning needs. It appeared that these teacher candidates self-reflected their pedagogy and activity planned through this experience. This twofold study showed teacher candidates who performed action research incorporating UDL

principles developed a foundation and preferred to use this approach in their future classrooms.

Lesson Plan Form

The more teachers provide modalities of instruction, the more students relate to what they learn. For example, they can make use of given information, make connections to their experiences, activate their prior knowledge, construct new concepts, and make sense of what they learned (Curry et al., 2006). Therefore, it is essential for educators to address these elements in their lesson designs. The study conducted by Spooner et al. (2007) utilized a UDL lesson plan form addressing the following items: objectives, materials, procedures, guided practices, independent practices, assessments, and examples of how to incorporate the UDL principles into lesson plans. A similar but different UDL lesson plan format was used for training teacher candidates in special education for the study conducted by Curry et al. (2006). This UDL lesson plan form included the following components: student background information and concerns; IEP goals; lesson objectives; content standards; materials specifically used for representation; action, expression, and engagement; references for evidence-based teaching resources; lesson format; introduction (anticipatory set); body (modeling, guided practice, and independent practice); closure; evaluation; as well as modifications and adaptations (Curry et al., 2006). A small number of lesson plan models exist that are applicable to address UDL (McGuire-Schwartz & Arndt, 2007). Therefore, it is essential to identify which types and elements of lesson plan forms will help teachers and teacher candidates facilitate the planning process.

Gaps in Research

As UDL principles are promoted across the country, there seems to be growing emphasis on teacher preparation programs to prepare teachers and teacher candidates for the application of UDL in the classroom. For example, the New York State Education Department (NYSED) started its UDL initiative in 2001. One of the goals set by NYSED's UDL initiative was to incorporate UDL principles and practices to teacher preparation programs for general and special education (Muller & Tschantz, 2003). Likewise, the Universal Design for Learning Task Force in Maryland recommends to the Maryland State Department of Education, as well as institutions of higher education, the following elements to be provided:

- Ensure the coursework, planning, and delivery for teacher and administrator preparation programs to include modeling of UDL principles and guidelines.
- Teach UDL principles in both general and special education method courses.
- Encourage teacher candidates to plan lesson and units by using the UDL Educator Checklist.
- Utilize observation tools used by cooperating mentor teachers and university supervisors that include UDL guidelines.
- Provide support and professional development for UDL principle and guideline implementations (Maryland State Department of Education, 2011).

As UDL becomes a common practice in education, an increasing number of states are requiring teachers and teacher candidates be better prepared for its application in the classroom.

UDL Principles and Application

Spooner et al. (2007) conducted experimental research on the effectiveness of UDL training in lesson planning. They indicate that more research concerning teacher training on UDL principles and its application is needed. Courey et al. (2012) noted there were interesting findings from their study in the effectiveness of UDL training on the planning of lessons. For example, when participants explained how materials addressed in their lesson plans would be utilized and adjusted in each UDL principle area, some of the listed materials, and their adjustments within lesson plans, were left out of their explanations. In addition, the researchers found there was a common discrepancy between how participants described the implementation of their lesson plans versus what was actually indicated and listed. For instance, the participants explained how new concepts would be modeled by using manipulatives and web-based games. However, the participants explained that students would problem solve by using paper and pencil with worksheets. These discrepancies may be an attribute as to why participants scored lower on the scale for multiple means of action and expression. It is evident that training on UDL needs to ensure that this area is understood and applied by its trainees.

Courey et al. (2012) also imply that these participants might have experienced traditional teaching and assessment techniques when they were learners in their own education. In this case, they might need more experience with UDL in order to change their lesson planning and teaching behaviors having originated from their traditional learning experiences. However, there is a lack of model classrooms using UDL through

which teacher candidates can observe and learn its implementation (McGuire-Schwartz & Arndt, 2007).

UDL Training Effects on Generalization

The research shows the effectiveness of UDL training on lesson planning (Courey, et al., 2012; Spooner et al., 2007). However, it is unknown if trained teacher candidates will be able to generalize what they gained from UDL training then implement these UDL lesson plans in real classrooms (Courey et al., 2012). The study conducted by McGuire-Schwartz and Arndt (2007) points out that their findings were limited in terms of describing teacher candidates' perspectives and experiences. Edyburn (2010) states that in order to observe desirable performance products from UDL, educators need to pay particular attention to the complexities among interactions between learning objectives, characteristics, support, technology, and outcome. Conclusively, in addition to individual interviews, focus group interviews, and lesson plan reviews, classroom observations examining actual UDL lesson plan implementation can supplement this gap in research. Further research is needed by teaming special education teacher candidates with elementary or secondary general education teacher candidates so co-planning UDL lessons for real classroom implementations can take place (Courey et al., 2012). The application of UDL principles needs to be a shared effort among general and special education teachers alike, as they aim to enhance access to general education curriculum for students with disabilities and their typically developing peers.

Summary

An increasing number of school-age students with disabilities are being taught in general education classrooms alongside their typically developing peers (Sindelar, et al., 2006). IDEA (2004) and NCLB (2001) address standard-based education for all learners including students with disabilities. These educational policies highlight access to general education curriculum for every learner (Meo, 2008). In order to make general education curriculum accessible to learners to the widest extent possible, UDL principles can be applied to curriculum and lesson development by teachers (Kurtts et al., 2009; Meo, 2008). For these reasons, this chapter focused on the following elements: (a) educational policies; (b) history and theory of Universal Design; (c) Universal Design for Learning; (d) strategies for the application of UDL; (e) obstacles and challenges to its application; (f) training, support, and resources for planning and implementing UDL; and (g) gaps in research.

This chapter informed the reader of three components in relation to the training of teachers and teacher candidates on UDL:

- Teacher preparation programs need to train both general and special education teachers in the understanding of UDL principles and its application to the development of curriculum, unit, and lesson plans.
- Teachers and teacher candidates who receive training on UDL need to be provided ample practice opportunities for the planning and the implementation of UDL principles.

- More research on the effectiveness of UDL training is needed in the areas of lesson design and implementation
- Comprehensive observations on trainees' understanding of UDL principles and their performance of UDL application to their actual teaching in their classrooms are needed.

Based on these emerging themes, this study explored teacher candidates' perceptions of their (1) understanding of UDL principles, (2) experiences and observations of how UDL was implemented in classrooms, (3) implementation and application of what they learned in relation to UDL and their classroom practices, and (4) experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL. The next chapter will explain the methodology of this study.

CHAPTER III

METHODOLOGY

This phenomenological study was designed to examine teacher candidates' experiences in relation to Universal Design for Learning (UDL), a set of teaching principals that promotes equal learning opportunities to learn (CAST, 2014). The study explored teacher candidates' perceptions of the following four elements: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL.

Participants of this study included teacher candidates majored in special education: general curriculum as well as teacher candidates majored in the dual major in elementary education and special education: general curriculum. These participants were enrolled in early field-based experiences in their senior year teacher preparation programs in Fall 2014. In order to recruit these participants, convenience case sampling, a purposeful sampling procedure (Creswell, 2007; Miles & Huberman, 1994), was performed. Their participation in this study was voluntary and was not a part of their course requirements or assignments.

Data were collected through five individual interviews, one focus group interview, and five lesson plan reviews. In this data collection, there were four data sources: (a) the individual interviews, (b) the focus group interview, (c) the lesson plan reviews, and (d) descriptive and reflective field notes. Figure 2 shows the participants' majors and areas of participation in this study. Four participants from the major in special education: general curriculum as well as the dual major in elementary education and special education: general curriculum participated in the individual interviews, the focus group interview, and the lesson plan reviews. One participant majoring in special education: general curriculum engaged in the individual interview and the focus group interview without participating in the lesson plan review. Another participant majoring in special education: general curriculum engaged in the lesson plan review without participating in the individual interview and the focus group interview due to health concerns at the time of the study.

Participants' Majors and Areas of Participation in the Study						
Participant	P-1	P-2	P-3	P-4	P-5	P-6
Special Education Major		✓			✓	✓
Elementary Education and Special Education Dual Major	✓		✓	✓		
Individual Interview	✓	✓	✓	✓	✓	
Focus Group Interview	✓	✓	✓	✓	✓	
Lesson Plan Review	✓	✓	✓	✓		✓

Figure 2. Participants' Majors and Areas of Participation in the Study.

Data analysis involved the following elements: (1) triangulating data through (a) transcripts from the individual interviews and the focus group interview, (b) the lesson plan reviews, and (c) the descriptive and reflective field notes; (2) a member-checking with the participants; and (3) having a second reader for identifying themes and subthemes. This process was considered to increase the validity of the qualitative study (Creswell, 2007). Specifically, conducting the member-checking and having the second reader to identify themes among participants' responses ensured an enduring ethical validation (Creswell, 2007). Also, reviewing the descriptive and reflective field notes ensured a substantive validation (Bogdan & Biklen, 1998; Creswell, 2007). In addition to these validation strategies, an interrater agreement and a content analysis based on transcribed interviews with the second reader increased the reliability of this study (Creswell, 2007; Nardi, 2006).

The following components are described in this chapter: (1) rationale for using phenomenology, (2) context of study, (3) data collection procedures, (4) data analysis procedures, and (5) ethical considerations. This study was guided by the following research questions.

1. How do teacher candidates enrolled in the major in special education: general curriculum and the dual major in elementary education and special education: general curriculum perceive their understanding of UDL?
2. How do these teacher candidates perceive UDL implemented in classrooms through their field-based experiences?

3. How do these teacher candidates perceive their implementation and application of what they learned related to UDL to classroom teaching practices?
4. How do these teacher candidates perceive their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL?

A summary of the following elements including the research questions, participant groups, numbers of participants, settings, data sources, and analysis procedures were provided in Table 1.

Research Design

A qualitative research methodology was applied to this study in order to examine perceptions of UDL among teacher candidates majored in special education: general curriculum and in the dual major of elementary education and special education: general curriculum. Specifically, this study explored these teacher candidates' perceptions of: (1) their understanding in UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL. The guiding research questions were described in Chapter 1 and this chapter. The research matrix presented in Table 1 described groups of participants and research questions to be answered by particular participant groups.

Table 1

Research Matrix Examining Teacher Candidates' Experiences in Relation to Universal Design for Learning

Research Questions	Participant Groups	<i>n</i>	Settings	Data Sources	Analysis Procedures
1. How do teacher candidates enrolled in the major in special education: general curriculum and the dual major in elementary education and special education: general curriculum perceive their understanding of UDL?	TC in SE TC in EESE	3 3	On campus	(1) Individual interviews. (2) A focus group interview. (3) Lesson plan reviews.	(1) Triangulating data: the individual interviews, the focus group interview, the lesson plan reviews, and the descriptive and reflective field notes.
2. How do these teacher candidates perceive UDL implemented in classrooms through their field-based experiences?	TC in SE TC in EESE	3 3	On campus	(4) Descriptive and reflective field notes.	
3. How do these teacher candidates perceive their implementation and application of what they learned related to UDL to classroom teaching practices?	TC in SE TC in EESE	3 3	On campus		(2) Member-checking the data with the participants.
4. How do these teacher candidates perceive their experiences in (a) supports, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL?	TC in SE TC in EESE	3 3	On campus		(3) Having the second reader for identifying emerging themes.

Note. EESE= elementary education and special education: general curriculum; TC = teacher candidates; SE = special education: general curriculum; UDL= Universal Design for Learning.

There were four data sources in this study: (a) the individual interviews, (b) the focus group interview, (c) the lesson plan reviews, and (d) the descriptive and reflective field notes. After the data were collected, the following data analysis were conducted: (1) triangulating data through (a) the transcripts from the individual interviews and the focus group interview, (b) the lesson plan reviews, and (c) the descriptive and reflective field notes; (2) the member-checking with the participants for transcribed content clarification and identification; and (3) having the second reader for identifying themes and subthemes. The result of the study was analyzed for identifying an overall understanding, experiences, implementations, and perceptions of UDL among these teacher candidates majored in special education: general curriculum and enrolled in the dual major in elementary education and special education: general curriculum.

Rationale for Using Phenomenology

This study employed a phenomenological qualitative research approach. Phenomenological studies describe commonly shared experiences among a group of individuals based on a phenomenon (Creswell, 2007). Specifically, this study applied transcendental phenomenology (Moustakas, 1994). Creswell (2007) suggests Moustakas's (1994) phenomenological research approach which focuses on describing participants' experiences and less focuses on researchers' interpretation of the participants' experiences. First, the researcher collected pieces of information addressing individual experiences through interviews with participants. Second, interviews were transcribed. Third, horizontalization by highlighting significant quotes from the interview was performed. Through this process, clusters of meaning were identified through the

interviewees' highlighting statements. By using identified clusters of meaning, descriptions of commonly shared experiences were identified through categorizing them into themes and their subthemes. In analyzing themes, textual descriptions and structural descriptions of participants' experiences were identified in order to find out an overall experience of the participants. It is essential that phenomenological studies require researchers to bracketing personal experiences as much as possible so that they can interpret phenomenon experienced by the participants with reduced biases (Creswell, 2007; Moustakas, 1994). In this study, personal bias was identified by the researcher by taking reflective field notes. Thus reviewing these reflective notes was considered to decrease the bias identified by the researcher (Bodgan & Biklen, 1998).

Context of Study

In order to explore teacher candidates' perceptions of: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL, this study was conducted with undergraduate teacher candidates at a university located in the southeastern regional United States. The university offers K-12 special education: general curriculum as well as K-6 elementary education and K-12 special education: general curriculum teacher preparation programs.

Background of the University

This university provides six units of academic schools on the main campus: School of Education; School of Business & Economics; School of Nursing; School of Health and Human Sciences; College of Arts and Sciences; and School of Music, Theatre, and Dance. There are more than 18,600 undergraduate and graduate students are enrolled and 2,500 faculty members and staff are employed at this university. Specifically, more than 17,500 students are enrolled on campus and 950 students are enrolled in distance-learning programs. These students represent the population of 49 states and over 70 countries.

Department of Special Education

This department provides undergraduate students with a variety of teacher preparation options such as teacher preparation in Special Education, General Curriculum (K-12); Elementary (K-6) and Special Education, General Curriculum (K-12); Early Childhood Education (B-K); and Deaf and Hard of Hearing (B-12) and Special Education (General Curriculum). The department also provides specialized programs in Professions in Deafness including Advocacy and Services for the Deaf Concentration as well as Interpreter Preparation Concentration. In addition to these undergraduate programs, the department offers Master's Programs in Birth-Kindergarten Interdisciplinary Studies in Education and Development and special education: general curriculum, as well as Ph.D. Program in special education. Eighteen fulltime faculty members work with over 400 students in undergraduate and graduate programs in the department.

Special education: general curriculum major. Students in this major learn to (a) increase knowledge of students with high incidence disabilities, (b) deliver effective instructional strategies and interventions to work with students with high incidence disabilities in the general curriculum, (c) develop appropriate classroom management skills and behavioral interventions, (d) implement formal and informal assessment methods, and (e) demonstrate effective communication and collaboration skills with families, colleagues, and other professionals. The teacher preparation program in special education: general curriculum requires students to complete the following: (a) general education (i.e., liberal arts) requirements; (b) coursework required for licensure by the state; (c) and special education major coursework needed to learn best practices for teaching high incidence disabilities (K-12) needed to learn best practices for effective instruction with the state standard course of study. Thus, they are required to complete a total of 127 semester hours including three early field-based experiences and a student teaching.

This program prepares students to work with school-age learners with high incidence disabilities such as learning disabilities and emotional disorders through an emphasis on: (a) supportive and positive culturally competent interactions with parents and families of individuals with disabilities; (b) interprofessional collaboration; (c) student and family support for transitions; (d) assistive and instructional technology applications; (e) and positive support for behavior. They complete a minimum of 52 semester hours in the professional program, in addition to teacher licensure requirements. They also are expected to complete second academic concentration requirements. Among

senior year students who are enrolled in the special education: general curriculum major in Fall 2014, four students will be recruited for this study. During the Fall 2014 semester, these seniors have the third early field-based experience at local public or private schools.

Elementary education and special education: general curriculum dual major.

Students in the dual major program in elementary education and special education: general curriculum are trained through learning to (a) enhance knowledge of students with high incidence disabilities, (b) implement effective teaching strategies and interventions for working with students with high incidence disabilities in the general curriculum, (c) develop appropriate classroom management skills and behavioral interventions, (d) apply formal and informal assessment methods, and (e) demonstrate effective communication and collaboration skills with families, colleagues, and other professionals. The teacher preparation program in elementary education and special education: general curriculum requires students to complete the following: (a) general education (i.e., liberal arts) requirements; (b) coursework required for licensure by the state; (c) special education major coursework needed to learn best practices for teaching high incidence disabilities (K-12); and (d) elementary education (K-6) needed to learn best practices for effective instruction with the state standard course of study. Thus, they are required to complete a total of 127 semester hours including four early field-based experiences and a student teaching. In student teaching and seminar, they spend ten weeks in an elementary education setting that enrolls students with disabilities and six weeks in a secondary special education setting.

This program prepares students to work with students in elementary education (K-6) and special education: general curriculum (K-12) with and without high incidence disabilities such as learning disabilities and emotional disorders through six emphasis areas. These areas are: (a) supportive and positive culturally competent interactions with parents and families of individuals with disabilities; (b) interprofessional collaboration; (c) student and family support for transitions; (d) assistive and instructional technology applications; (e) and positive support for behavior. They complete a minimum of 36-39 semester hours in elementary education and 38 semester hours in special education: general curriculum. They also are expected to complete four courses in teacher preparation courses offered by other teacher education departments in addition to general education core requirements. Four senior year students in the dual major in elementary education and special education: general curriculum will be recruited for this study. In the Fall 2014 semester, these students have the fourth early field-based experience at a local public or private school.

Participants' Background Information

The participants included three senior year undergraduate students majoring in special education: general curriculum and three senior year undergraduate students majoring in the dual major in elementary education and special education: general curriculum. These participants may have had unique background experiences that could possibly influence their understanding and perceptions of UDL as well as its implementations. These background experiences were documented during the individual interviews.

Data Collection Procedures

Phenomenological qualitative methodology was implemented in order to examine teacher candidates' perceptions of: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL. In order to reduce the research bias and improve the data collection method, the researcher conducted a pilot study to develop three different types of questionnaires for surveys, individual interviews, and a focus group interview (Chenail, 2011).

Pilot Study for Generating Focus Group and Interview Questionnaires

In fall 2013, the researcher piloted the Likert scale survey among students with varied levels of education: undergraduate, masters, and doctoral program in special education on campus. The interview and the focus group questionnaires were generated from the participants' survey responses during a pilot study. After developing the individual and the focus group interview questionnaires, experts in this field of social sciences were asked to provide feedback on these questionnaires. A pilot focus group was implemented in fall 2012, with the aim of identifying biases and clarifications of the research methodology. Through these feedbacks from the pilot study participants, the individual and the focus group interview questionnaires were regenerated based on their feedback.

Data Collection

Four data sources were identified in this study: (a) the individual interviews, (b) the focus group interview, (c) the lesson plan reviews, and (d) the descriptive and reflective field notes. The distribution of participants' majors and areas of participation in this study is shown in Figure 2.

Individual interviews. A total of five individual interviews were conducted with two students majored in special education: general curriculum and three students majored in the dual major in elementary education and special education: general curriculum. Participant 6 was unable to engage in the individual interview due to health issues at the time of the study. These individual interviews were placed at varied locations on campus as convenient for the participants. Individual one-hour interviews were structured with open-ended questionnaires focusing on teacher candidates' understanding and perceptions of UDL as well as its implementations in classrooms. The interviews were audiotaped after receiving permission from each participant. The researcher transcribed the audio files from these interviews. The identical questionnaire developed for individual interviews was implemented for all participants regardless of their education majors. In this way, the researcher was able to identify participants' unique experiences in their major and perceptions of inclusive and UDL practices. The open-ended interview questionnaire was included in Appendix A. After the individual interviews were conducted by the researcher, the researcher generated transcripts to identify emerging themes. In addition, the participants were provided an opportunity to meet with the researcher on campus for the member-checking and asked if there was any information

that they wished to clarify, add, or delete. In this way, the investigator was able to perform the member-checking with the participants, simultaneously, the participants' right to make decisions for which information to be included and excluded were protected.

A focus group interview. The focus group interview was conducted with two students majored in special education: general curriculum and three students majored in the dual major in elementary education and special education: general curriculum. Thus, a total of five students participated in the focus group. Participant 6 was unable to engage in the focus group interview due to health issues at the time. The focus group was conducted on campus as a convenience for the participants. The focus group interview approximately took ninety minutes and were structured with open-ended questionnaires. The focus group was audiotaped with permission from each participant. The audio file was transcribed by the researcher after the focus group interview was completed. The open-ended focus group questionnaire was included in Appendix B.

Review of lesson plans. Participants were asked to submit their lesson plan prior to the individual interviews. The researcher reviewed the lesson plans before and after the individual interviews. The participants were asked questions related to their lesson plans for clarifications during the interviews. The review of lesson plan supplemented information regarding how participants would plan and intend to implement the application of UDL principles for teaching practices. First, the lesson review protocol in Appendix C was utilized for the lesson plan reviews in this study. By utilizing this protocol, elements of UDL principles identified in the participants' lesson plans were

categorized into (1) before lesson, (2) during lesson, and (3) after lesson. Second, the detailed checkpoint features from Universal Design for Learning Guidelines- Version 2.0 (CAST, 2011) were adapted and charts were created as shown in Figure 4, 5, and 6 in Chapter Four. Checkpoint features under each of three UDL principles and their explanations were utilized for grouping lesson plan activities into subcategories. This adaptation of Universal Design for Learning guidelines (CAST, 2011) was utilized to guide subcategorization of UDL practices identified in the lesson plan review protocol. The subcategory boxes were filled in gray to show they were not presented in these lesson plans. Third, the results of the lesson plan reviews were grouped according to the UDL principles; (1) multiple means of representation in Figure 4, (2) multiple means of action and expression in Figure 5, and (3) multiple means of engagement in Figure 6.

Descriptive and reflective field notes. The researcher took notes during the individual interviews, the focus group interview, the lesson plan reviews, and the member-checking with the participants. These notes included participants' background information, gestures, and comments. These notes were used during data interpretation, theme identification, and the member-checking procedures. Thus, analyzing data was more comprehensive and bias brought by the researcher was identified.

Data Analysis Procedures

Qualitative data analysis was conducted after the data collection was performed through four data sources: (a) the individual interviews, (b) the focus group interview, (c) the lesson plan reviews, and (d) the descriptive and reflective field notes.

Data analysis in this study was a trifold procedure: (1) triangulating data through (a) the transcripts from the individual interviews and the focus group interview, (b) the lesson plan reviews, and (c) the descriptive and reflective field notes; (2) the member-checking with the participants; and (3) having the second reader for identifying themes and subthemes.

Simply conducting frequency counts for vocabularies appeared in the qualitative data is not considered vigorous data analysis (Chenail, 2012). Thus, the researcher analyzed the qualitative data by coding, categorizing, and identifying themes (Chenail, 2012) through a triangulation of data such as (a) the individual interviews; (b) the focus group interview; (c) the lesson plan reviews; and (d) the descriptive and reflective field note. The researcher's notes taken throughout the data collection of (a) the individual interviews, (b) the focus group interview, and (c) the lesson plan reviews were used as the descriptive and reflective field notes. The open-ended individual interviews and the focus group interview were transcribed and their data analyses included the content analysis of data targeted to confirm or disconfirm inductive interpretation of these data (Miles & Huberman, 1994). The content analysis was performed by utilizing NVivo for Mac, the qualitative data analysis. Together with the descriptive and reflective field notes, themes and patterns evolving from the qualitative data analysis of (a) the individual interviews, (b) the focus group interview, and (c) the lesson plan reviews were subsequently discussed between the researcher and the individual participants. As discussing these components with participants, clarifications were made for the data analysis. In order to protect ethical research considerations, the researcher planned to

recognize the subjectivity of her own qualitative data interpretations, research position bias, and co-constructing ownerships of the data collection with participants (Creswell, 2007). For implementing this plan, this research involved the member-checking and the second reader.

Validity

In the qualitative data analysis, rigorous validation strategies suggested by Creswell (2007) were performed such as: (1) triangulating data through (a) the transcripts from the individual interviews and the focus group interview, (b) the lesson plan reviews, and (c) the descriptive and reflective field notes; (2) the member-checking with the participants; and (3) having the second reader. In addition, an ethical validation was conducted by exploring the researcher's assumptions related to morals, politics, ethics, and equity of participants' voices (Creswell, 2007). Enduring ethical validation was performed through discussions with the second reader and participants during the member-checking. Also, a substantive validation was performed by recognizing the researcher's understandings of the topic of the study and self-reflecting this study, its process and resources used (Creswell, 2007). In order to do so, the descriptive and reflective field notes were developed and analyzed (Bogdan & Biklen, 1998).

Reliability

In order to increase the reliability in the qualitative research, the researcher transcribed audio recorded interviews and examined an interrater agreement as well as a content analysis with the second reader (Creswell, 2007; Nardi, 2006). In addition, the interview transcriptions and data interpretations were shared with the participants to

make sure their intended comments during interviews were accurately reflected upon data transformations and interpretations.

Consistent data collection is essential to enhance the reliability. With the aim of conducting individual interviews and focus group interviews effectively, a researcher needs to acquire specific skills to proceed with the interview process (Lichtman, 2013). Developing interview protocols requires particular techniques, since it influences how participants share their experiences with an interviewer and how an interviewer learns about interviewees (Creswell, 2007; Lichtman, 2013). For instance, questions should be clear, outlined from general to specific, focused on a topic, open-ended, and not leading answers. Also, conversation skills such as listening to interviewees, asking and refining questions, elaborating answers, utilizing appropriate language without making assumptions affect how much rich information a researcher can retrieve. An interviewer may improve these techniques by experiencing numbers of interviews and continuously practice to improve these skills (Lichtman, 2013). The researcher aimed to advance these skills by conducting a pilot study and following established interview protocols (Yin, 2003).

Ethical Considerations

This research was approved by the Institutional Review Board. All participants were notified of their rights and information about the study including the nature of the study, confidentiality procedures, including collection and security for data, their role in the study and contact information for the researcher and the IRB. The participants were asked to sign a consent form verifying their willingness to participate in the study. The

researcher informed the participants that participating in this study was voluntary and would not affect them professionally or academically. Participants also were given a copy of their consent form. The IRB determined that participation in this study would pose minimal risk to participants. There were anticipated injuries or risks related to this study.

For ensuring participants' smooth understanding of their rights to participate in and withdraw from the study, the consent form included simple word choices and sentence structures. In addition to the written form, oral presentations were provided. Prior to agreeing to participate in the study and signing the consent form, all participants were encouraged to ask for clarification to address any concerns regarding their participation in this study.

Since the researcher was not an instructor for participant students or a faculty member at this university at time when this study was conducted, she had no influence over participants' education and profession. The researcher had access to the information gathered from the study findings and all of the information collected was treated as confidential by assigning numerical data organizations to protect anonymity of participants. Confidentiality for participants was kept by not identifying them by name during the audiotaped interviews. In addition, peer reviews and the member-checking were conducted in order to maintain confidentiality of personal identifiable information shared during the individual interviews.

Summary

A qualitative research methodology, a phenomenological inquiry, was applied to this study. Through phenomenological method, the following elements were explored:

the participants' (1) understanding of UDL; (2) experiences and observations in how UDL was implemented in classrooms; (3) implementation and application of what they learned related to UDL to classroom teaching practices; and (4) experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL.

A small sampling prevents the researcher from drawing generalizations from this study; however, a wider point of views was expected to be shared by recruiting participants from two educational major programs in this study. Three students majoring in special education: general curriculum (K-12), and three students majoring in the dual major in elementary education (K-6) and special education: general curriculum (K-12) were recruited for this study. Thus, there were a total of six participants in this study. Five individual interviews and one focus group interview were conducted with these participants. In addition to these interviews, five lesson plan reviews were implemented. One participant majoring in special education: general curriculum (K-12) and three participants majoring in the dual major in elementary education (K-6) and special education: general curriculum (K-12) engaged in all elements of this study including the individual interviews, the focus group interview, and the lesson plan reviews. Two other participants majoring in special education: general curriculum (K-12) either engaged in the individual interview as well as the focus group interview, or solely engaged in the lesson plan review. The participants' majors as well as areas of participation in this study are illustrated in Figure 2. The data were collected from four sources in this study: (a) the

individual interviews, (b) the focus group interview, (c) the lesson plan reviews, and (d) the descriptive and reflective field notes.

The data analysis involved the following procedures: (1) triangulating data through (a) the transcripts from the individual interview and the focus group interview, (b) the lesson plan reviews, and (c) the descriptive and reflective field notes; (2) the member-checking with the participants; and (3) having the second reader for identifying themes and subthemes. This data analysis procedure was implemented to enhance the validity of this research. In addition, an interrater agreement and a content analysis were conducted in order to increase the reliability in this study.

CHAPTER IV

RESULTS

The purpose of this study was to describe perceptions of teacher candidates in relation to Universal Design for Learning (UDL) in four areas: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL. A total of six teacher candidates, three of them majored in the special education: general curriculum, and three others majored in the elementary education and special education: general curriculum dual major, participated in this study. A group of three teacher candidates majored in the special education: general curriculum was enrolled in their third field-based experience at time when this study was conducted. Another group of three teacher candidates majored in the elementary education and special education: general curriculum dual major was enrolled in their fourth field-based experience while this study was implemented. One of three participants from the special education: general curriculum program participated in individual interviews, a focus group interview, and lesson plan reviews. Two other participants from the same program participated in either the individual interviews and the focus group interview, or solely the lesson plan reviews. The distribution of participants' majors and areas of participation in this study was shown

in Figure 2. All of three participants from the elementary education and special education: general curriculum dual major program participated in the individual interviews, the focus group, and the lesson plan reviews. All participants were in their senior year in their teacher education programs and assumed their student teaching in the following semester.

Data were collected through (a) the individual interviews, (b) the focus group interview, and (c) the lesson plan reviews. During this data collection, the descriptive and reflective field notes were developed by the researcher. Four participants completed the individual interviews, the focus group, and the lesson plan reviews. Participant 5 completed the individual interview and the focus group, and Participant 6 completed the lesson plan review. Data analysis was conducted by following qualitative data analysis procedures suggested by Creswell (2007).

Data analysis included the following components: (1) the content analysis with (a) transcribing the individual interviews and the focus group interview highlighting significant quotes, (b) categorizing themes based on clusters of meanings derived from the significant quotes from the individual interviews and the focus group interview, as well as highlighted elements in the lesson plan reviews; and (c) identifying textual and structural descriptions of participants' experiences to describe an overall experience shared by the participants; (2) the member-checking the data with the participants; and (3) having the second reader for identifying emerging themes and subthemes.

The individual interviews, the focus group interview, and the lesson plan reviews were analyzed by the researcher and the second reader. Digital audio files from the

individual interviews and the focus group interview were transcribed in order to transform these data for analysis. After transcribing these interviews, the transcriptions were analyzed by highlighting significant quotes from the individual interviews and the focus group interview. These highlighted significant quotes were categorized into themes based on clusters of meanings by using NVivo for Mac. Through these emerging themes, the researcher identified subthemes with textual and structural descriptions of participants' experiences to describe an overall experience shared by the participants.

The lesson plan reviews were conducted by utilizing the lesson plan review protocol. First, by using the lesson plan review protocol, elements of UDL principles included in the participants' lesson plans were categorized into (1) before lesson, (2) during lesson, and (3) after lesson. Highlighted and categorized lesson plan elements were then subcategorized into subgroups. Second, the UDL principles from Universal Design for Learning Guidelines- Version 2.0 (CAST, 2011) were utilized to guide subcategorization of UDL features identified in the lesson review protocol. Each element of checkpoint features in the three UDL principles (CAST, 2011) served as subcategories. The subcategories were filled in gray to identify they were not presented in these lesson plans. Third, the results of the lesson plan reviews were grouped according to the UDL principles; (1) multiple means of representation in Figure 4, (2) multiple means of action and expression in Figure 5, and (3) multiple means of engagement in Figure 6.

Along with this process, the descriptive and reflective field notes developed by the researcher were reviewed for reconfirming the interpretations of an overall experience in understanding, observing, implementing, and applying UDL principles among the

participants. The interpretation of the overall experience among the participants was discussed with the participants for member-checking to make sure their intended answers during interviews were clarified and accurately reflected upon data transformations and interpretations as well as to establish enduring ethical validation. The second reader also highlighted significant quotes from interviews, categorized them into themes, and identified textual and structural descriptions of experiences among the participants in relation to their perceptions toward UDL principles and their application of UDL for lesson plan development and field-based experiences for an interrater agreement to establish the ethical validation and reliability. The lesson plans were also reviewed by the second reader through categorizations of UDL principles and features incorporated in the participants' lesson plans. The second reader's interpretation of the data was extensively discussed with the researcher by confirming and reconfirming their descriptions derived from emerging themes.

Results from the individual interviews and the focus group interview were explained under reoccurring emerging themes with subthemes from identified data sources. Emerging themes reoccurring among the participants and across the data sources included (1) benefits and practicality, (2) dedication to building UDL competency, (3) collegial support, (4) overcoming challenges, (5) advanced application, and (6) personal commitment. Subthemes under these six themes also were identified. The summary illustrating the recurrence of emerging subthemes from the individual interviews and the focus group interview was shown in Figure 3.

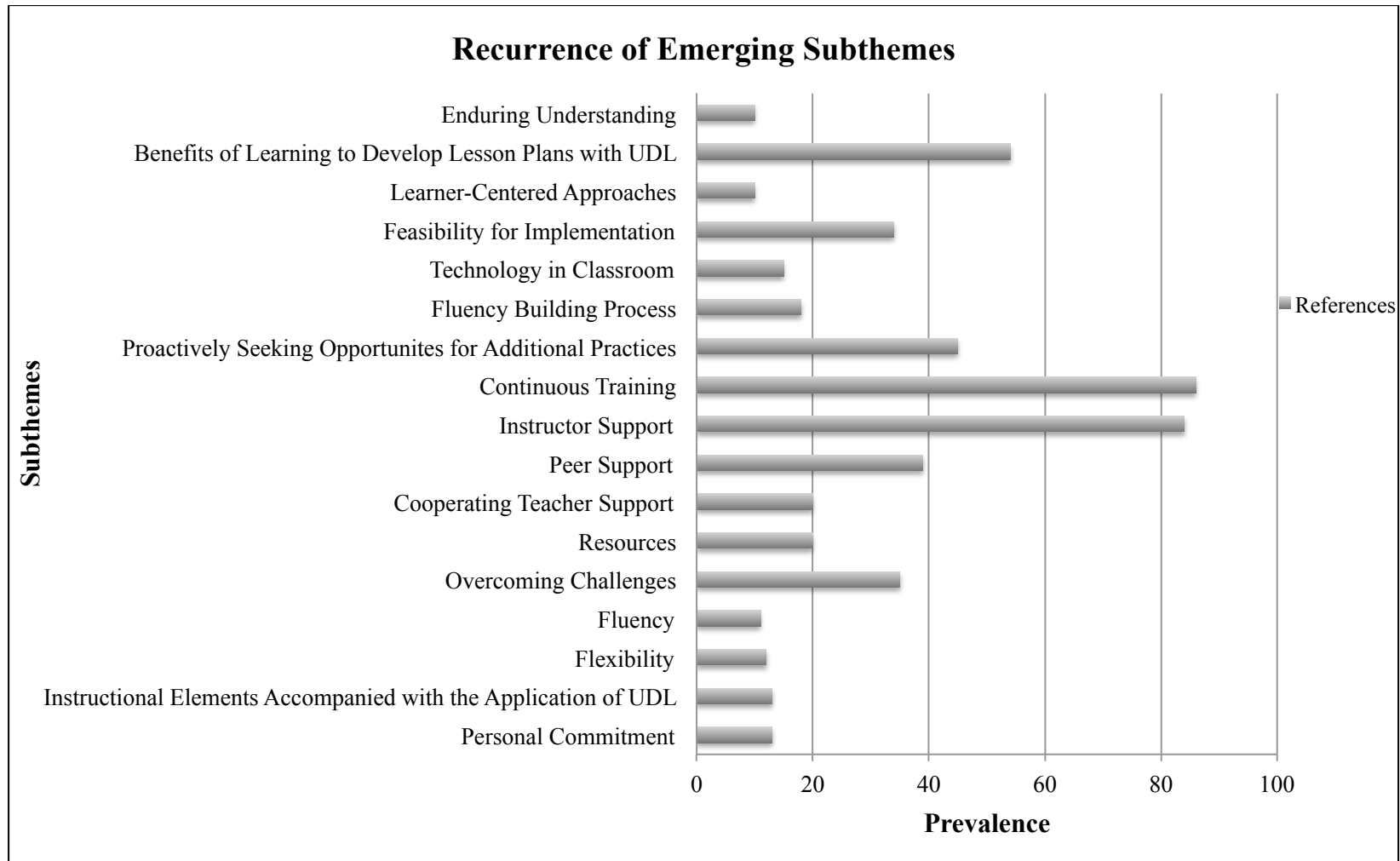


Figure 3. Recurrence of Emerging Subthemes from the Individual Interviews and the Focus Group Interview.

Subthemes were reported under each of the six emerging themes. The first theme, benefits and practicality, included the following subthemes: (a) enduring understanding, (b) benefits of learning to develop lesson plans with UDL, (c) learner-centered approaches, (d) feasibility for implementation, and (e) technology in classroom with low to mid technology as well as high technology. A total of 123 references in these seven subthemes determined the first theme. The second theme, dedication to building UDL competency, included the following subthemes: (a) fluency building process and (b) proactively seeking opportunities for additional practices. A total of 63 references in these two subthemes formed the second theme. The third theme, collegial support, included the following subthemes: (a) continuous training with community-based experiences, scaffolding in the program, and simulation for lesson planning and implementation, (b) instructor support with direct instruction and hands-on practices, (c) peer support with collaboration and co-planning opportunities, (d) cooperating teacher support, and (e) resources. A total of 249 references in these five subthemes established the third theme. The fourth theme, overcoming challenges, highlighted respective descriptions from the participants and included 35 references. The fifth theme, advanced application, included the following subthemes: (a) fluency, (b) flexibility, and (c) instructional elements accompanied with the application of UDL. A total of 36 references in three seven subthemes determined the first theme. The sixth theme, personal commitment, informed the participants' action plans for utilizing UDL in the future and included 13 references. The results of the content analysis identified these themes and subthemes and were shown in Table 2.

Table 2

Categories of Emerging Themes and Subthemes from the Individual Interviews and the Focus Group Interview

Themes	Subthemes	References
Benefits and Practicality	Enduring Understanding	10
	Benefits of Learning to Develop Lesson Plans with UDL	54
	Learner-Centered Approaches	10
	Feasibility for Implementation	34
	Technology in Classroom	15
	Total	123
Dedication to Building UDL Competency	Fluency Building Process	18
	Proactively Seeking Opportunities for Additional Practices	45
	Total	63
Collegial Support	Continuous Training	86
	Instructor Support	84
	Peer Support	39
	Cooperating Teacher Support	20
	Resources	20
	Total	249
Overcoming Challenges	Overcoming Challenges	35
	Total	35
Advanced Application	Fluency	11
	Flexibility	12
	Instructional Elements Accompanied with the Application of UDL	13
	Total	36
Personal Commitment	Personal Commitment	13
	Total	13

Benefits and Practicality

The first reoccurring theme that emerged from the individual interviews was practicality for students and teachers as a benefit of utilizing UDL principles. All participants agreed that UDL was a practical tool as they learned to develop lesson plans for students with a wide range of abilities. When they were asked to explain their understanding of what UDL was to them, they provided concrete examples from rigorous resources. They further explained some elements of a UDL lesson planning and implementation process that they particularly favored. For instance, the lesson plan form addressing UDL principles helped them address multiple means of representation, action and expression, and engagement in lessons they developed. Another point the participants commonly mentioned was an easiness to follow UDL principles in the lesson plan form to thoroughly address these multiple instructional and learning means. Some participants discussed how they could focus on developing learner focused learning activities while planning UDL lessons. It was not only practical for students but for teachers to share lesson experiences in the classroom. As an essential element of UDL, they also discussed the use of technology in the classroom.

Enduring Understanding

In the opening of the individual interviews, all participants were asked to describe what they knew about UDL. They provided definitions of UDL based on CAST (2014) and explained it was founded upon universal design in an architectural concept. For example, Participant 4 explained UDL by connecting physical accessibility in buildings with curriculum accessibility at school.

UDL is Universal Design for Learning and it's based off of principles of ADA and making things accessible. ADA is physical structures making them accessible for people with disabilities, and Universal Design for Learning is making content accessible for students who need multiple ways of representation, engagement, and expression. And so, being able to give students the choice and giving them the option of expressing themselves or teaching them in the way that they know.

Participant 5 explained UDL similarly to Participant 4 and added an opinion that UDL was what good teachers had already been practicing.

Sammy might learn better being lectured. Sally might learn better with visual aid. So, it's incorporating that all of those into a lesson so you can reach every type of students... that's just being a good teacher... to me it's reaching every each child which is engrained in us from the beginning about individualized education.

Participant 2 also mentioned about CAST (2014) when she defined what UDL was to her. She commented that she learned about UDL throughout her experiences in her teacher preparation program and it became a sense of unremarkably intentional practices for her.

We were being taught about UDL everywhere... how was UDL applied to a lesson plan, which was blowing my mind at first... to me you don't just sit there and talk the whole time. That's not UDL. So, I think once you understand it...it's common sense.

Benefits of Learning to Develop Lesson Plans with UDL

In the individual interviews, the participants described their perception of UDL principles as an easy tool to utilize the development of a lesson plan. The participants expressed that utilizing UDL principles made a process of learning to developing lesson plan easier. It was suggested that the UDL lesson plan form helped them focus on including multiple instructional and learning. Participant 1 explained what she liked

about learning to utilize UDL principles through the UDL lesson plan form which included elements reminding her of these principles.

At the bottom of the lesson plan, it has the multiple modes and that's one thing that really helps me because I'm a visual person so... I liked it. I liked it just because it was an easy format to understand, and it made sure you hit every area you needed to hit and it made sure you are giving multiple opportunities for students to show what they know and multiple opportunities for students to engage in the lesson...overall I enjoyed it.

Participant 1 was asked how she would plan a lesson incorporating UDL. She explained how she would include multiple means of representation, action and expression, and engagement in her lesson plan. By predicting what students would say, how they would make errors, and how they would think about what they were learning, she planned her lessons with UDL principles.

The way that I look at UDL was that it lays everything out from the beginning of the lesson to the end. And the way I do it is, I decide from activating strategy. I decide what I'm going to do. And then for the procedures, I script out my lessons and then I refer to the website. I always write out my procedures and my script, and then I move into the multiple opportunities of expression, representation, and engagement. One thing I struggled with was the error correction but now that I have more experience in the classroom, you know what your students are going to say, and you know where they are going to mess up and where they are going to kind of go outside the box. During the procedures of lesson I write out questions that I'm going to ask, and in the error correction process I give examples of what students may say, and that helps me plan out. And it also helps you plan out your next lessons in the future. That's one thing that I liked about UDL.

Participant 2 also described that she planned lessons by predicting what students would say and do. In this way, UDL lesson plans made her instruction easy to teach content.

I feel like when I implement UDL, I have to sit down and visualize my class, how it's going to go, and it takes me an hour or more... I feel like it's much better to use the ones with the UDL. I will just have to skim right before, but I think it made teaching so much easier. Because when you have this, the modes and you thought about how it's going to reach each child, and you thought about 'what if they say this?' then you are prepared... It prepares you so much more than just saying 'I'm going to give them a worksheet'. I don't feel so nervous when I teach.

Participant 3 explained the benefits of writing lesson plans when incorporating UDL principles. By incorporating UDL principles, she felt she could reach students with a wide range of abilities in classroom.

I do like the extending and refining part though, because I don't normally think about it and I had a problem with this in my internship right now... you have so many different students at different levels and a lot of times in the lesson plan I wouldn't put how to extend this for students who finish early, or how am I going to take a step back and refine this if most of the students or even a couple, just a couple of students don't understand the content. So, I love that part.

Participant 5 liked to incorporate UDL principles into her lesson plans, because this process would help encourage her to develop interesting and engaging lessons for students.

It's the fact that we don't get stagnant as teachers. We don't get lazy. We are constantly having to think as if we are doing UDL. You're thinking really hard about 'okay, what can I do to make this and this interesting and most engaging?' And if you have that guideline, 'okay, I need to do it this way', then you have, I mean there is no choice, you have to actually put work into it.

Learner-Centered Approaches

In the individual interviews, several participants expressed how their uses of UDL principles helped them focus on student learning when they developed lessons.

Participant 2 pointed out that the use of UDL principles encouraged students to utilize their knowledge to make growths.

I'm in a high school setting right now and I feel like confidence is a really big thing to give it to those students... not 'well you can't do this or that'. So when you let them do how they can do, I thought that they excel at a higher rate.

Participant 5 expressed that UDL is a practical tool for inclusive practices. "I think that's a great thing, because that allows all the students to get something from that, and not single out a student who has special needs". Participant 3 also described how UDL lessons helped her focus on student learning when she developed lessons.

I feel like it's a lot to have to write, because this would have been a 3-page lesson plan, but with all about it turning into a 5-page lesson plan. And that's good, because it does make me elaborate on 'do I have enough engagement?' and 'what am I doing to engage students?' and same for expression and representation.

Participant 1 described how she would maximize student learning during her instruction by having flexibilities built into her lesson planning.

For the multiple opportunities of expression, I would do that separately. If someone is a kinesthetic learner, I'll have them draw a picture or build a model. The ones who aren't, I'll have them write their answers out. I found that it's okay to do all that at the same time, so if there are a few students who are not good at writing or they can't write because of their disability, I have them doing their models, their pictures or their cue cards or whatever they have to do... Then I'll have the other students write another answer. And I've learned it depends on your classroom. So you'll just have to play it by ear when you get your classroom... The thing that I really learned a lot about this semester is just being flexible and not always sticking to exactly what you planned.

Feasibility for Implementation

Another emerging subtheme from the individual interviews was their perception of practicality in terms of implementing UDL lessons in their field-based experiences.

Participant 2 stated that the layout of the UDL lesson plan was easy to follow while addressing UDL principles during instruction.

It has everything so broken down, and it has the Intro, the I Do, We Do, and You Do. So I can sit there and think okay, I know this is where my assessment to be, so you just kind of play out in your head. It's just easier because it's so broken down and you can follow a good order when you have that.

Participant 5 also pointed out that a UDL lesson plan reminded her of taking scaffolding steps during instruction.

Because we really get excited about our strategies and activities that we forget 'oh, wait, these students might not even know what we are talking about'. So, we have to go back to the beginning and make sure to set those expectations then the facts that are activating strategies are listed at the beginning. That's always good because we might forget. And then the summarizing, a lot of the times we get over excited and we just want to keep going and keep going and 'okay, now what? We need to summarize the lesson'.

Technology in Classroom

In the individual interviews, the participants discussed how they observed and utilized technology in the classroom as a part of the application of UDL during their field-based experiences. In these interviews, they discussed a wide range of technology used in the classroom and the practicality and effectiveness of lessons incorporating its use in the classroom. Their experiences in the use of technology were unique and

commented on connections between selections of technological resources in classroom and student needs.

Low to mid technology. When participant 5 was asked what types of technology she thought she used to increase access to general education curriculum, she explained her experience in observing its benefit for student learning. She also explained that she had more experiences in utilizing low to mid technology than high technology incorporated resources.

I know the very first few lessons that I taught in the middle school placement, we went to the computer lab and I was able to see a whole new set of skills with some students. Their computer skills were phenomenal, which is something that I hadn't been able to see. That was good to know. Because some students type three times the speed that he would write anything. So being able to see 'oh wow, he can express his learning a lot better if he has a keyboard'. But overall I don't feel like I've had a lot of experience. I like to have audio resources for students if it's possible...I use technology in a sense of ... different pencil grips and working with occupational therapists. Those kinds of technologies I'm more familiar with than computer-based technology. I think in inclusion settings, they are such a role of technology for manipulatives and pencil grips, and those kinds of things for students to use, and then being able to explain concepts concretely through things like manipulatives that are types of technology. I'm more familiar with those.

When Participant 2 was asked if she saw the uses of low technology, she responded by stating she saw a good uses of low technology in her field-experience site.

Some students just need giant erasers. They just balance their pencil and they use the whole eraser...There are so many little things teachers do. It's just hard to pick up on all of it because something that's so simple can really mean so much.

High technology. Participant 5 had more experiences in utilizing high technology when she was asked if she would have used mid and low technology in classroom.

“Yeah, I’ve never had any of those [mid and low technology in classroom]. My first semester, they had iPads®. And then the second semester... I saw some iPad® use”.

Participant 2 expressed a similar opinion to Participant 5’s in the individual interview regarding the use of technology. She added that the uses of technology in the classroom had made instruction more exciting and fun for both students and teachers.

I think the iPads® are fabulous for the students... We have a few students in our room and you can program the iPad® to speak for them. It’s great...I like the boards. When I was at the elementary school, it’s like a SMART Board™ and the pen was the part that hooked to the computer. Students figured out how to use it faster than I did. But it was awesome because they would go from the math problems and it made it fun. The computer would shoot to the board and the pen was like a mouse for the computer so that they could draw. They could solve the problem on the board and then they could erase it. Then they could find the answer. It made it more exciting.

Participant 3 also favored the use of SMART Boards™ in the classroom from a multifunction and cost-effective perspective.

I love the SMART Board™ because there are so many things to do with it...So it’s not always having to buy expensive technology if you already have the SMART Board™. I can save the notes that are taken with the students. Students know how to use it or, will be able to learn how to use it. I would like that.

Participant 3 further elucidated how she experienced the use of technology in her field-based experiences as a part of UDL element. She commented how her cooperating teacher and she used technology for informal assessments and tied it to the general curriculum.

[My cooperating teacher] has taught me a lot about using technology and applying it to general curriculum. He has an i>Clicker™ set, so every student will have a,

b, c, d, e buttons to press, and we'll project it on the screen. You can make the questions online and it could be used with Allinlearning.com. You can tie it into the common core, so they'll make questions for you with common core, and then you can add your own questions or you can tweak these questions. That ties into general ed. curriculum wonderfully... and that would look like what they would see on the end of the grade test. It helped them to see the general curriculum and how it would be tested.... I like the i>Clickers™ that my teacher has right now, because it's an easy assessment just to see what students are understanding and what students aren't. It's usually anonymous too. I could look up on my computer which students got it and what their rate was for accuracy for one i>Clicker™ assessment portion. I can easily see once they have taken the question and once I put it up and answered it, and I ended the question I can tell what percent got it right, right then. It's just really good for an assessment, because I can say 'okay, only 33% got this right, we need to do this right now', it was 'go ahead and refine this'. I would definitely like to use something like that... We've used i>Clickers™, just simply document cameras, he does not have a lot Wi-Fi out there. It's very spotty. So I've wanted to do more things like that, but he doesn't have the SMART Board™, so we have to be very creative with our technology... They are also getting tablets soon, so that would be something that they'll use to incorporate general curriculum.

Participant 1 described that she enjoyed the use of technology in teaching with her occasional difficulty when incorporating the use of technology into instruction.

We have a lot in the OCS program. We have a lot of stimulations. Going to an ATM machine and get money out, writing checks, going to drink machines, and purchasing things at a store and making sure that you have the right amount of the change... I see as being high technology today. I personally like to implement technology because for some students that's the way they learn, by using technology and seeing it on a screen. So I really, I really like technology in my lessons... I enjoy technology and I enjoy incorporating technology, but it doesn't always work. You have that problem. For example, I have one student who refuses to get on a computer. He has nothing to do it, so we take everything online and print it out and put in a binder, and he does it in the binder... For example, the school systems that I came from, we didn't have the SMART Boards™ and all that until I was in the... I think I was senior in the high school when they got the SMART Boards™. We always used projectors or we didn't use any technology at all. It all depends on your students and how they learn because if you have a classroom full of students who don't like computers, then they are not going learn as well. I think all primarily depends on the student.

Dedication to Building UDL Competency

The second emerging theme from the individual interviews and the focus group interview was the participants' dedication to building UDL competency. With a concrete understanding of what UDL is and where it came from, the participants practiced to develop UDL lessons across their coursework and field-based experiences. Thinking of student needs observed in field-based experiences helped participants visualize how they would address student needs when developing lessons. With a belief that UDL would be a practical instructional and learning tool across academic settings, they practiced developing and implementing lessons. They provided a variety of concrete examples as to how they incorporated UDL principles into their lessons that they implemented in their field-based experiences, along with reasons for choosing to address multiple means within UDL principles in their lessons. Some participants also provided their insight on how they would like to seek opportunities to practice developing and implementing UDL lesson plans in addition to course requirements.

Fluency Building Process

Participants had been engaging in their third or fourth internship semester at the time the individual interviews were conducted during this study. In the individual interviews, they explained how they had been practicing to develop UDL lessons and implemented them through their field-based experiences. For example, Participant 1 pointed out that thinking of a real classroom and students she worked with at her field-based experience helped her develop UDL lesson plans in her preparation to become a teacher.

We are always in different internships, but I know when we get our own classroom, we'll know our students well enough to know what they are going say and where they are going to go wrong. So it's always best to have students' interests in mind when you are writing your lesson plan for sure.

Participant 2 commented that she was unsure of how her UDL lesson would work at first until she implemented it. She believed that UDL would be used across learning environments. "I didn't know how it would work as well with them, but now I could see it working really well with any type of content, any type of age range". This concept was also mentioned by Participant 3 in the individual interview. Participant 3 provided an example of how she incorporated UDL principles into her lessons when she taught students with disabilities as well as English Language Learners.

I'm doing four units small units and I'm doing multiplying decimals, dividing decimals, and in-between those two, I did divisibility rules... Right now, I have a student who uses a specialized pen so I always put that in my lesson to make sure that's under adaptations... I'm trying to be very explicit when I'm teaching too. I tend to go over things very frequently...some students need that...I put that I will be using visual representations like the grid that I used which I'd never seen before for multiplying decimals...And I also related that to money as well, but that's a real-world application too...for any type of students, especially students who have disabilities and students who are English Language Learners. Usually it's a visual work representation emphasizing language that we were using in math. And since this is particularly partner work I like to include that because having the working partners and having me coming around and monitor as well helps with language development and it helps with them understanding the concepts.

Participant 2 also provided an example of how she included multiple means of representation, action and expression, and engagement in her math class in her field-based experience.

For the representation, the lesson I gave you [the unit on money] I did one-day lesson and they needed to recognize coins. So, I gave them posters on the board that matched their posters on their desk, and then they had fake money. Then they had games it matched for their fine motor skills, too. So they saw the fake money, they saw the chart, and they saw the posters, so the representation was there in a lot of ways. And at the end, they got to play, and they would have their coins. They'd also have their desk charts. Some of them didn't have anything.

Participant 4 described rationales for delivering multiple modes of engagement at the beginning of her lessons.

When you first bring up the topic, letting students express their background knowledge in that topic in multiple ways, so whether that's conversation, whether that's writing, whether that's coming up and telling the teacher 'how you know how to think about this', whispering to the teacher that they don't know...you know that's okay... I feel like a lot of times with this activating background knowledge to see where they are, it can't be this piece of paper that reflects their knowledge. So from the beginning knowing where to start, even before teaching the lesson, it starts with letting students express their knowledge in multiple ways before starting. And then when I start teaching the content or the concept, at the very beginning making sure it's engaging in multiple ways and it's not just like 'here's one video, let's get excited' kind of thing. But trying to connect it to their lives, having them making those connections before we even get into it.

Participant 5 had an example of multiple objects for students to use in math class as multiple means of representation. She also mentioned multiple means of engagement through individual and group work she assigned in her math class.

I did a unit plan where I did measuring. And I remember starting out by teaching the students how to measure with their foot with a little yardstick, and then putting things around the room for them to find and then measure. So break them up into two groups, and one group has to find this, this, this, and this, and then measure it and then write how many inches. Then the other group had to do it. So it allowed them to actually be interactive with one another, and if one person is not really grasping it, they can feed off of each other. And not only like they can write it down and they can visually see it. They can actually see the concrete

object, and then they can show to the rest of the class. So they can learn through showing each other.

Proactively Seeking Opportunities for Additional Practices

In the individual interviews and the focus group interview, the participants addressed additional training in UDL in order to improve their proficiency in UDL lesson planning. In addition to course requirements and field-based experiences in their teacher preparation programs, the participants expressed they would like to engage in additional opportunities for the development and implementation of UDL lessons. Participant 4 pointed out she was willing to engage in more opportunities in hands-on experiences in addition to what was already required. “I think basically what I said, it boils down to the confidence. So, if anything I’m just going always go back to experience and hands-on.” Participant 1 also shared her willingness to engage in additional teaching experiences in the implementation of her UDL lesson plan.

We have unit plans but we are not always necessarily going to implement them... so then not to have that experience of ‘oh well what went wrong or what was not good for my students’. So I think it's just a matter of having more time to implement them... and for me, that was kind of hard because if I write a lesson plan, I want to teach it.

Participants shared similar comments in the focus group as well. For example, one participant commented on spending additional hours in field-based experiences.

Even with those of us who have spent a lot of time around students, we won’t mind having more time with students... I’ve grown up around students with disabilities my whole life. But I don’t mind spending five extra hours during the internship, I don’t mind.

Other participants agreed with this idea to spend additional time in field-based experiences.

We are required to be there the same amount of time every semester, ten hours a week. But each year, we are doing more, so we are teaching more lessons. We are incorporating strategies the past two semesters. We've had strategy notebooks and we are not required to implement those, but I've taken them with me. My teacher said 'oh, this is awesome, I've never seen these. This is cool'.

Another participant commented on this description that by taking this step, the result would make their field-experiences further meaningful.

Collegial Support

The third theme that emerged from the individual interviews and the focus group interview was collegial support in their programs, instructors, peers, and cooperating teachers. In the individual interviews, participants shared their perspectives of how their programs supported the application of principles they learned from coursework to their field-based experiences. In the focus group interview, the participants shared there were a variety of ways that their program supported their learning process along with UDL including community-based experiences, scaffolding in the program, and simulations for lesson planning and implementation. In addition to instructors' extensive feedback on their lesson planning and implementation, participants recurrently mentioned that direct instruction and UDL modeled by instructors including hands-on experiences as a support system was perceived as helpful. Peer support through collaborative work such as: sharing resources and helping each other to understand materials, as well as co-planning lesson practices with peers, was another helpful element the participants discussed through the individual interviews and the focus group. In the individual interviews, some

participants also described their resource network and tools they utilized in their learning process for the application of UDL practices.

Continuous Training

In the individual interviews, some participants provided examples of how their programs helped them continuously practice utilizing UDL principles throughout coursework. Participant 1 explained how she utilized UDL principles in different lesson planning settings.

I don't necessarily use the UDL lesson plan all the time but I use the purpose and concepts of it all the time. So technically it's still a UDL but it's in a different format. I told you that we have other forms but they follow UDL principles... we still have to tell how we are going to differentiate and the different modes of representation, so...

Participant 1 also commented that the program supported her application of what she had learned from previous coursework to her field-based experiences.

We practice the principle of UDL, but we don't necessarily practice a UDL lesson plan all the time... It's all about taking what you've learned across the board, and applying it... And I think as a senior, I can look back and say that everything prepared me for that ...It's all about knowing what you know and taking what you've learned and applying it to those students.

Participant 3 also mentioned that her study in the program had been supportive in the application of UDL principles through coursework.

All of my special ed. courses I have made in UDL. When I use UDL it makes me think about what I am teaching and how I am going to engage them, and then how I am thinking about independent work. I usually do my actual content in an activating strategy and the summarizing strategy first and then I make my

assessment. Then I go into my engagement and representation and I talk about what I did in my contents...no matter what template I use.

This perspective also was shared during the focus group interview as a discussion. One participant opened the discussion stating she felt being prepared going into student teaching next semester because of her extensive practices in developing and applying lesson plans to her field-based experiences. Another participant commented, “now I look back and that was the best thing that could be done, doing it, and doing it, and doing it. And so now when we are going into student teaching, it’s just so natural”. Other participants agreed with their comments.

Community-based experiences. In the focus group interview, one participant recalled that it was helpful to seek and experience resources in the inclusive community as a part of the course requirement.

Last year, I know we did the P.A.T.H. and that I fell in love with it. It was great to see the resource that out there, so that you talk to parents, there are these great resources out there that it’s not just the classroom. There’s so much others look out for. And even when we were in our reading class, I think it’s really good that we have these other experience that aren’t like just classroom and students. And that makes us see things from a different way and different mind, and it gives us confidence, too.

Another participant agreed and shared her perspective of having an inclusive community-based experience.

I feel like it’s great to be able to do internships like everybody said, but having the experience with like P.A.T.H. and Beyond Academics, and I hope there could be more of those. First we looked and we were like ‘oh, more things to do’, but really it does work and it does help.

Scaffolding in the program. In the focus group interview, the participants also discussed their perceptions that their programs provided scaffolding as they learn to become a teacher. For example, having a series of field-based experiences was mentioned as a scaffolding process during the focus group interview. One participant commented, “we are there a lot at first but we were only expected maybe teach one lesson or two, and then its time goes on. Now...we are there and we are teaching, and we are doing”. Another comment in relation to self-reflective activities was made.

My experience and my reflection in the program have taught me so much. Looking back, they helped me so much....especially videoing our lessons. That really helped me, because we have to video our lessons, talk to our group about it, and then reflect based upon that. And that just helped me so much.

Simulation for lesson planning and implementation. Another aspect of the program that aided their learning process was simulation in classroom. In the focus group, the participants described how they developed a lesson plan and its implementation in classroom with their classmates. Although teaching their lessons to classmates in the mock classroom at the university was not the same experience as teaching students, they liked this process and perceived that it helped them. They commented that this process helped their classmates while also learning to teach reading to intermediate readers.

Instructor Support

In the focus group interview, participants provided explanations of how they perceived instructor support for their learning. In the individual interview, Participant 1 described her experience in an introduction to UDL in the program.

When we were first introduced to UDL [in class], it was a great way to be introduced to it. And we were separated into groups, and we had to research the different modes of representation, engagement, and expressions.

Participant 4 explained her experience in scaffolding provided by an instructor as, “I think at the beginning, it was... ‘alright, this is what it is’, and then slowly becoming more comfortable with applying it, which is a scaffold practice”. Participant 2 described how constant feedback from an instructor on her lesson plans was very supportive.

It was ‘write this and fix it’ and then ‘write this and then fix it’... You pick a subject, any subject, and just practice scripting and writing like it really happened. And if we give it to [the instructor and the instructor] is going to give us feedback first. [The instructor] would show you, ‘you need to script more here’, and [the instructor] explains why it’s important... We had to redo them, and then we give back, and [the instructor] commented... And so we just go over all of the plans that we did. [The instructor] is really good at... guiding a little bit, and giving us more direction individually, so that we can understand... [The instructor] is great with feedback. We write them, just to write them to show [the instructor], so I think it was great support for that.

Participant 4 also commented on the extensive feedback she received as support for her learning.

The amount of feedback [the instructor] gave us, going through over then individual things specifically UDL, ‘alright, I didn't see how you represented it in multiple ways. Please explain it to me on the previous day how you did that’. And I think [the instructor] conferenced with us one on one to over these lesson plans for 45 minutes talking about the specifics of this lesson plan, and how I actually did it.

Direct instruction. Another aspect of scaffolding provided by instructors was described as direct instruction in their programs during the individual interviews.

Participant 4 described that direct instruction was constantly used and modeled by her

instructors when she took courses. “They showed us how they would do it, and then we do it as a group, and now we do independently. So that’s usually how they would teach us.” Participant 2 described that this process includes a real-world application through direct instruction.

[The instructor] covers things of just, I love how [the instructor] does it. [The instructor] explains what it is and then applies it into a story or could apply it to us, and then we just get it. So it’s putting it in real terms... using stories like case studies and her teaching experiences... [The instructor] does demonstrate, and [the instructor] does give examples, and [the instructor] will always tell stories and give an example, and then we relate it back to ourselves and how we can use it.

Participant 3 commented that course instructors in her programs modeled UDL lessons in her courses.

Our professors here at the college were the ones that I feel like have used it... [The instructor] would do her lesson plans while she was teaching us and then say okay, this would be the I Do, and then [the instructor] would do what [the instructor] was teaching us about. And then [the instructor] would engage us, and it would be both parties working, and [the instructor] says this would be our We Do. And again have us for independently make something or create and use our knowledge that would be You Do. Those types of things really helped.

Participant 2 explained it was beneficial that she received direct instruction as a teaching model in her course that she could apply to her learning process.

The best thing...in the whole world...we learn briefly...then we apply completely. We make projects, we have discussions... Everything in [the instructor’s] class is fun. It’s literally taking what you did and making games and posters and themes and ideas as a group which helps.

Participant 5 also described teacher models, guided practices, and independent practices as well as UDL instruction provided by an instructor in course as supportive in her learning process.

I think it's because [the instructor] is to the heart of special ed. teacher and [the instructor] treats us like [the instructor] expects us to treat our students, and I think that because [the instructor] is always so understanding and you know, [the instructor] realizes that we all have lives, and [the instructor] is just very much like 'if you're not getting it, that's okay, we are going to change how we are teaching it to you'. And I think that's our goal for us being teachers. [The instructor] has really just inspired and motivated a lot of us. And the fact that [the instructor] is always... incorporating fun into the lessons, so it doesn't really feel like we are sitting in the class. [The instructor] understands that not all of us learn the same way.

Hands-on practices. In the individual interviews, the participants described how they had opportunities to perform hands-on practice through direct instruction provided by instructors. Participant 1 commented, "I think you having projects where you have to apply what you know is the most helpful...I think having our in-class projects we did... I think that [is helpful] ". Participant 2 commented that she learned to apply and implement UDL principles throughout her study in the teacher preparation program. She further explained hands-on guided projects as instructor support.

When you teach us about it, it's making it a real situation, UDL is this and this and this, having a case study and applying it, and having the relating it to our internships. I think that helps... with anything we learn in this program, when we can apply it, it's so much easier to remember.

Peer Support

In both the individual interviews and the focus group interview, participants described that they had a peer support system in their programs to help support their learning process together. Participant 4 described how her peers helped her clarify her lesson components.

I think sometimes...you write a lesson plan out, and you go back to the UDL part, and 'wait a second, what exactly is this?'. And then I'll call friends and... they'll [say] 'well, it's already right in your lesson'. So, I think that's the most difficult part, because you have your I Do, We Do, You Do, and you...put those in there.

Participant 3 explained a built-in peer support system in one of her courses that focused on applying UDL principles.

The most helpful I have to say it to be the last semester we did a math unit plan using UDL. And then what we did was that we all wrote different ones, and we would give it to [the instructor] and [the instructor] would, yeah it was a draft, and [the instructor] revised it and we would give her all of our lesson plans. And then we had to make a poster showing the five days or however long our lesson plan was. And then our assessment, you show some our samples of UDL lesson plans and, we've got to see everyone else's posters and how they interpreted this different topic using UDL. And that was really helpful, because you've got to see different in different takes on different things, and you've got ask them questions. Another student and I had the same topic just randomly. And she took it to the different way than I did. And so, it was cool to see how she differentiated differently and how she scaffolded than how I did. And I liked that a lot, because it was very helpful of seeing that it's not just black and white picture, UDL is very pliable, very flexible, and very much your own creation and how you interpret UDL makes your lesson plan. So, it was very, it was a very neat to see that and I'd never seen so many examples of UDL at one time, which is good. It was really good.

Participant 3 also described how sharing resources with her peers at the poster presentations was a meaningful experience.

We could see where they got the resources. Some of us gave out the resources or at least let them take pictures of them, because they were still doing the strategy notebooks to assist help with that notebook. So, we'd got to see where they got those ideas from. It was a really good experience.

Collaboration. In the focus group interview, peer collaboration was mentioned in discussions. Collaborative work was perceived as a tool that enhanced their learning in the program. One participant described that the program focused on productivities through collaboration. Other participants agreed with her comment as follows:

I think the education college has prepared us to work collaboratively as well. I noticed the class we have now is mostly collaborative...Now I want to work collaboratively. I want to make things better from everyone's perspectives and building it. And about the program, we are taught to be collaborative, not only through our teaching, but also to one another.

Co-planning opportunities. The participants also generated a discussion of peer support by co-planning lessons. One participant gave examples of co-planning practices in her class.

We had to write with partners for a couple of them [in a class]. And then in our class that we all had together, we do unit plans and we present, but every night in that class, we make plans together. And then we sometimes present it what we would do it. [For example, her classmate] has come up with some really good ideas about how to do this one strategy. And she helped our group and then we made a [lesson] plan.

Another participant made comments on her willingness to co-plan with her altered partners despite her concern for its time consuming process.

I like planning with people. The only thing is that it takes so much long. The other thing is... I don't know if any of you guys is the same way, I know I am, from

starting the program, we create a bond with people... In the classroom you will have one co-teacher that you will teach with repeatedly and that's great, but to do learn how to develop those lesson plans and learn how to work with others, I feel like it's really important to have more exposures to other people and their ideas.

The other participant added her comments on peer collaborative work and suggested having co-planning lessons with her peers as a real-world teaching practice.

I think that's a good thing that we have with collaboration, because you're getting all those different people and you are not always with the same group and always with the team and so you are able to collaborate with different people who have different ideas and different strengths. We have a ...grade team and all teachers go together every morning for 30 minutes and talk about what they are going to do for the day. And then on Fridays, after school, they plan for the next week. So that's exactly what we would be doing. If we do that with our cohort, then I think that's perfect. That's just like perfect practice, practice for the future.

Cooperating Teacher Support

Another subtheme that emerged from the individual interviews and the focus group interview was the concept that cooperating teachers provided support and resources in the participants' acquisition and application process to incorporate UDL through field-based experiences. For example, Participant 3 explained her experience in observing and receiving UDL related resources from her cooperating teacher at her field-experience.

Just the teachers themselves were resource and then really show us examples of UDL and teach using UDL as well, so those helped us a lot. Definitely my teacher that I work with, he has so many things. So he's definitely a major resource.

Participant 2 described guided practices for lesson planning provided by her cooperating teacher in her field-based experiences.

She sat me down and explained everything to me... She said, 'you need this here, and this here, and this here'. She showed me and that was the most helpful thing...it had the common core and it had the UDL... I had seen her lesson plans since day one. She emailed them to me every week. She took her lesson plan and broke it down into mine. So, that was really helpful.

Participant 2 further explained how another cooperating teacher incorporated UDL into a lesson in field-experiences. Even when the cooperating teacher did not mention UDL principles, she witnessed UDL principles were built in lessons that she observed.

Some of the students...they do baking and it's not as simple for them to do it. That's just not how it's going to work. So he has it in the visual... makes it the vocabulary words for a cup means, and he does it and he shows them, he makes it really fun and interesting, so he does multiple modes, since they can't go in there and physically do it. He makes it interesting and he tries to hit few of these IEP goals in the process... He does not speak about UDL at all. I can ask him about UDL, but he, I don't think he thinks on that level at any more, I think he just thinks what's best for the students, that's what he says at least.

Participant 3 also commented on her observations of UDL principles implemented by her cooperating teacher, and its cohesiveness from what she learned in her methods courses in the program.

I do see the cohesiveness and I see it being applied and I think the more I've gone through the program, the more I can recognize things... And a lot of my teachers that I work with, I don't even think they realize that they are scaffolding, but they are, because they are so used to it. But for me, I have to plan it out, because you I'm still learning it. So I see that as a unintentional thing on some of my teachers that I work with, they just don't even realize that they are doing it but they are scaffolding and differentiating. That's partially because I think they have used UDL or they have them taught in special education environments so they know that they need to that automatically. It's nice to see how learning things and methods courses bridges over into internship. It definitely, definitely does especially in our special ed. placements.

Participant 5 was asked if she would plan UDL lessons with her cooperating teacher and discuss about UDL principles. She commented that even when her cooperating teacher and she did not talk about UDL, they would discuss UDL principles.

I feel like a lot of teachers, we don't talk about UDL, but we'd say 'how are we going.... how are we going to assess students in different ways?, how are we going to engage students in different ways?' I talk about it with my OSTEs because it is important for a lot of our students.

In the focus group interview, one participant mentioned how she witnessed the application of UDL performed by her cooperating teacher.

I think we are taught that special educators to be... when we script, 'it's like what are they going to say?' you know. My teacher now, he... he doesn't say UDL, he doesn't write lesson plans, he's just on his feet all day see things and just switch the whole dynamic based on the needs of the students. And he has two classes running with two different levels in his room. And he just is... it's his second nature, so he doesn't have to tell me. 'we are ready to do UDL today'. He just does it.

Other participants also made similar comments based on their experiences working with their cooperating teachers and having them as support and resources. The participants recurrently commented that having support from cooperating teachers was vital in their field-based experiences focusing on learning to incorporate UDL principles into their lessons.

Resources

In the individual interviews, some participants described other types of resources that they received and how they were utilized in their program in order to learn to apply UDL for their teaching practices. Participant 3 explained a list of resources that she used

in the past such as: online teaching strategy resources, strategy notebooks, evidence-based strategies, and textbooks. Participant 2 commented that instructors' presentations, notes, and handouts from courses were essential to learning in classes; however, she also explained that electronic resources were practical and helpful for her.

I think once we understand, because we have to have the PowerPoints® and the notes to understand, but once we reach that level, having the electronics as a source for there on would be really helpful... It's so much easier for me to jump online and go to that website, and say representational... it spells out so easy and so convenient.

Participant 1 also explained that she had been utilizing online resources.

I still use the website... It gives you a lot of examples based on where your students are... when you can use the information you've already have of your students, and then go to the website, and then develop your own lesson plan... I think it's better for me... The set up is easy for me to understand and it's very clear. It will tell you exactly what different modes of representation are and different modes of opportunities are. That really helps me, because when writing lesson plans, sometimes you don't always know what you are going to do and having that resource from the website is really good.

Participant 4 utilized CAST (2014) as a refresher resource to remind her of elements in UDL to be incorporated during her lesson planning.

And I still use that website sometimes when I lesson planning. I will be... 'oh okay, so this is what this is again, okay I can't believe I've forgotten, but let me go back and change this and have in multiple modes of expression'. And so, I think that website has been a great tool.

Participant 1 commented that she used her strategy notebooks as resources when she incorporated multiple means of representation, action and expression, and engagement into her lessons.

[Where] I pull resources from personally is the strategy notebooks. For last semester, we focused a lot on reading and vocabulary skills, and so when I'm writing a reading lesson plan, I always pull from those strategies. We have so many professors that are willing to like help out, so anytime we need ideas, they are always willing to help us. I've had a lot of teachers who's given me a lot of [resources from] websites and teacher blogs to read, and there is a lot of resources with that.

Overcoming Challenges

A third theme that emerged from the individual interviews was the ability to overcome challenges while advancing their understanding and proficiency in teaching through UDL principles. The participants described their challenges concurrently with their thoughts on how they would overcome these challenges. Some participants mentioned their challenges of improving their competency in the application of UDL as they constantly attempted to improve their teaching performance. Participant 3 described that she would like to more frequently engage in quick reviews and reminders in relation to topics covered in the past so that she would be able to more deeply understand and sharpen her application of these topical items. Participant 5 also explained her eagerness to open in-class discussions regarding lesson examples as models and non-examples to be improved through which her classmates and she would make suggestions for changes to be made in non-examples. She described how this would be a beneficial opportunity to practice effective lesson plan development. Participant 1 explained a challenge that she

attempted to overcome as she continuously practiced in teaching incorporating UDL principles.

Whenever you do the multiple opportunities for representation, it's hard. I want to do it all at once, and it's hard for me not to. It's hard for me to split it up so that my students are having it flows well in my lesson. And it comes with practice and now that I'm a senior, I'm definitely improved in that part, but I always want to do all these activities to reach all my students' needs, but I have to realize that I have to do it one at a time, because my students get confused...

Participant 4 described that gaining experience in teaching would help her to overcome a challenge when instructional and learning strategies did not work as planned.

I'm sure in the first few years of teaching, I'll be getting a little bit like 'oh, no, I'm doing it wrong' or 'it didn't work'... And I think that something that takes time. I don't think it's going to happen over night. So I think for me that it's just going have to happen with experience. I think a lot of it is like just being able to have the confidence and being able to assume the responsibility regardless of the outcome.

Advanced Application

The fourth theme that emerged from the individual interviews and the focus group interview was the idea of advanced application of UDL among the participants. In building fluency in utilizing UDL principles, some participants described that they incorporated UDL into their lessons in different ways such as teaching students across grade levels concurrently, utilizing evidence-based practices along with UDL principles, and applying UDL principles to their lessons as their personally anticipated performance. Through ongoing teaching practices in the program, participants perceived that they were prepared to be flexible in the uses of UDL principles in their instruction. Some

participants also described how they utilized other instructional elements such as evidence-based practices and differentiated instruction along with an application of UDL principles in their instructional practices.

Fluency

In the individual interview, Participant 1 described an improvement in her teaching practices through the program.

When I first started, that [incorporating UDL principles into lessons] was so hard for me, because I always wanted to be involved in every student, and now that I've had the experiences, and I've taught enough lessons, it's just easy for me now to have multiple things going on in my classroom. Now, I'm in high school, and I have sophomores, juniors, and seniors in the same classroom... and it's not easy but it meets their needs, and that's what UDL is all about... the more practices you'd get better.

The focus group interview included a discussion of their fluency development in applying UDL principles into their lessons through their practices in the program. One participant described that she engaged in meaningful training in the application of UDL through the program. "We have in our natural senses to apply UDL. You need to have multiple ways that you present the information...it's just natural for us to do that, and that's because of all the trains that we have". Other participants agreed with this comment and further reflected on their thoughts on the application of UDL. Another participant commented that the application of UDL was already integrated into her regular teaching practices: "we are just doing this naturally, right? I just feel like that's what do". The other participant agreed that the application of UDL was a part of her personally anticipated

instructional foundation. Another participant described how the application of UDL was what a good teacher would do.

Flexibility

In the individual interview, Participant 1 explained her improvement in lesson planning and flexibilities that she made through self-reflections throughout her teaching practices.

I think experience is the biggest thing, because if you don't ever experience a lesson plan that's just absolutely falls apart, then I don't think you are ever be prepared to be flexible when it does happen. So, we've all had lesson plans that just crush and burn... I looked back last night on lessons that I wrote three years ago, and I [thought] what in the world is that... It really is all about change over time and how you improve while you are in the program. I draw from experience so it depends on my students, if I've tried something with my students and didn't work then I'm not going try it again. I always try to improve based on what happened last time. So that's really where I pull all from is experience.

In the focus group interview, participants shared their perceptions of flexibility in their instructional practices using UDL principles. One participant described that she reflectively thought about UDL principles throughout her instructional practices.

Then we even recognize when we need to apply these principles, even if we haven't written down, knowing okay the student didn't get what I was trying to teach... How am I going to represent this problem in a different way to make sure he gets this so he can do it on his own? So, I'd automatically think flexible enough to include the principles.

Another participant explained how she felt she was prepared for flexible uses of UDL principles: "That is one thing that I love about this program, because our professors will

sit us down and give scenarios such as that one”. The other participant described that she felt prepared to regularly apply UDL principles regardless of lesson plan format.

We understand the principles of it... we are thinking about that as we are writing them, and even if we don't write that part down, we know. And we know if this happens [unexpectedly], this is what I'm going to do. We've got it in our heads, and sometimes on papers, sometimes on the corners of paper, write what we would do. And so I feel like the lesson plan format isn't as important as like what we've learned from using the lesson plan format.

Instructional Elements Accompanied with UDL Application

In the individual interviews and the focus group interview, the participants discussed how they would utilize instructional strategies such as direct instruction, evidence-based instruction, and differentiated instruction along with an application of UDL principles. The participants' uses of direct instruction were discussed throughout this chapter in their descriptions of UDL lesson planning.

In the individual interview, Participant 5 explained how she utilized evidence-based practices when she developed and implemented UDL lesson plans.

I guess just the strategy notebooks, the evidence-based practices...the fact that you know we can take those and incorporate... in our classroom... If we have that knowledge about how to incorporate UDL, we can use those evidence-based practices and those strategies in appropriate ways.

The focus group interview included a discussion of UDL and differentiated instruction in addition to direct instruction which was included in the third theme: collegial support.

The participants gave examples of how they perceived their collegial support throughout the program including scaffolding and direct instruction provided by their instructors. In

addition to these instructional elements modeled in the program, the participants explained they were prepared to use differentiated instruction along with UDL. One participant described her application of UDL principles bridged with differentiated instruction.

Another thing that goes back to how our program prepares us... our whole entire program is based on differentiating the ways that we represent the information to our students or presenting most of our students the way that they express what they know, and motivate them to learn in different ways. And that's just what the whole program is about, and that's why [we] just naturally do UDL.

Personal Commitment

In the individual interviews and the focus group interview, the participants described that they would continue to incorporate UDL principles into their lesson planning process after they graduate from the program and when they have their own classrooms in the future. Participant 1 preferred to develop her lesson plan by using UDL.

I like UDL the best, because it just, and especially for special ed., because we have to accommodate for every student in our classroom, so I really... I'm going to plan to use it. It's really easy for me to understand, because I know the first year of teaching, it's going to be so overwhelming, and when you have this lesson plan that gives you what the teacher would do multiple ways, what the students would do multiple ways, and how the students and teachers would interact with the curriculum, it's right there for you and all you do is prepare it. And then when you go in to teach it and implement the lesson plan is so much easier than to search around what you are trying to find. And so when you have UDL, it's just right there and you know what you need, and you know what you're doing first, what you're doing second, and what you're doing the last.

Participant 2 was asked how she felt about utilizing UDL principles after she graduated from the program. She described her thoughts on continuing to utilize UDL lesson plans

as, “I would like to use it. I think it gives you a security back-up when you do teach, because if you forget what you want to do, you have it there already”. When Participant 3 was asked how she would incorporate UDL in her classroom after she graduates from the program, she provided examples that she would make it her own depending on content areas that she would teach in her future classroom.

I am most comfortable with using it. I’m feeling like I’m using it the most, so I probably would use it. I’ll probably combine them and make my own. I would keep UDL [part]. I definitely think it would depend on content and what area that I’m teaching. I would love to teach younger grades and this would be perfect, because I’ll have some students that will need that extra support, and some students that might be completely going above all the rest, and UDL will help me to be able to distinguish and differentiate between students. But if I was teaching like in a science environment that I probably will go from more of the science lesson plan. A math one I’m going to choose a math oriented lesson plan, but I would still make sure to put a lot of UDL concepts in lesson plans. So, overall I’ll probably make my own, but go by UDL.

Participant 5 described that she felt being prepared to utilize UDL principles in her student teaching and after graduation from the program: “I feel really confident in that, yeah. Very confident... I’m going to focus on... I Do, We Do, You Do and then the UDL part”.

In the focus group, the participants described their personal choice to utilize UDL principles in their lesson planning and implementation. One participant described that she would use UDL along with instructional differentiation.

I would choose UDL because it gives you that differentiation you need and then you know what you need in the classroom. We don’t really I know... some of us haven’t really decided where we want to be in the classroom. If you want to be in elementary, middle, you know, regular ed., special ed., inclusion, we don’t really

know. So I think regardless of where your place the UDL lesson plan will fulfill the needs of a good lesson.

Another participants also commented, “We use the principles naturally, so it’s always going to be there”. The other participant concluded a discussion of future UDL application as the following: “So, I’d automatically think flexible enough to include the principles”.

UDL Application through Lesson Planning

Throughout participants’ study in their programs, they learned to incorporate UDL principles to their lesson planning practices. The participants shared their lesson plans developed through their coursework for review in this study. Through these reviews, it appeared that the participants included each of three UDL principles: (1) multiple means of representation in (a) perception, (b) language, math expressions, and symbols, and (c) comprehension; (2) multiple means of action and expression in (a) physical action, (b) expression and communication, and (c) executive function; and (3) multiple means of engagement in (a) recruiting interests, (b) sustaining effort and persistence, and (c) self-regulation in their lesson plans. In addition, subcategorizations based on UDL subprinciples along with their checkpoints under each of three UDL principles indicated which element of UDL subprinciples were addressed in their lessons. The three UDL principles accompanied by these subprinciples were shown in Figure 4, 5, and 6. The subcategories that were not presented in these lesson plans were filled in gray.

UDL Principle	Providing Options	Checkpoints	LP-A					LP-B					LP-C				LP-D					LP-E				
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	5
I.	Perception	Display																								
		Auditory																								
		Visual																								
	Language, Math Expressions, and Symbols	Clarify vocabulary and symbols																								
		Clarify syntax and structure																								
		Support decoding text, math notation, and symbol structure																								
		Promote understanding across languages																								
		Illustrate through multiple media																								
	Comprehension	Activate or supply background knowledge																								
		Highlight patterns, critical feature, big ideas, and relationships																								
		Guide information processing, visualization and manipulation																								
		Maximize transfer and generalization																								

Figure 4. UDL Principle I Addressed in Lesson Plans. Adapted from “Universal Design for Learning Guidelines version 2.0,” by D. Rose and J. Gravel, 2011, retrieved from <http://www.udlcenter.org/aboutudl/udlguidelines>
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UDL Principle	Providing Options	Checkpoints	LP-A					LP-B					LP-C				LP-D					LP-E				
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	5
II.	Physical Action	Vary the methods for response and navigation																								
		Optimize access to tools and assistive technologies																								
	Expression and Communication	Use multiple media for communication																								
		Use multiple tools for construction & comprehension																								
		Build fluencies with graduated levels of support for practice and performance																								
	Executive Function	Guide appropriate goal-setting																								
		Support planning and strategy development																								
		Facilitate managing information and resources																								
		Enhance capacity for monitoring progress																								

Figure 5. UDL Principle II Addressed in Lesson Plans. Adapted from “Universal Design for Learning Guidelines version 2.0,” by D. Rose and J. Gravel, 2011, retrieved from <http://www.udlcenter.org/aboutudl/udlguidelines>
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UDL Principle	Providing Options	Checkpoints	LP-A					LP-B					LP-C				LP-D					LP-E				
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	5
III	Recruiting Interests	Optimize individual choice and autonomy																								
		Optimize relevance, value, and authenticity																								
		Minimize threats and distractions																								
	Sustaining Effort and Persistence	Highlight salience of goals and objectives																								
		Vary demands and resources to optimize challenge																								
		Foster collaboration and community																								
		Increase mastery-oriented feedback																								
	Self-Regulation	Promote expectations and beliefs that optimize motivation																								
		Facilitate personal coping skills and strategies																								
		Develop self-assessment and reflection																								

Figure 6. UDL Principle III Addressed in Lesson Plans. Adapted from “Universal Design for Learning Guidelines version 2.0,” by D. Rose and J. Gravel, 2011, retrieved from <http://www.udlcenter.org/aboutudl/udlguidelines>
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Lesson Plan A

Lesson Plan A was a series of five lesson plans in a science unit covering change and observable patterns for weather in kindergarten. The participant developed these lesson plans during her third semester in field-based experiences. These lesson plans addressed multiple means of representation, action and expression, and engagement. These lesson plans had an incorporation of children's literature in a section for activating prior knowledge in some lessons. Pictorial representations were utilized throughout lessons along with hands-on activities such as acting out, drawing, and manipulating objects. Throughout the series of lesson plans in a science unit, new knowledge was linked to familiar facts and activities that students could relate to. Some examples of these activities were listed in Table 3 for multiple means of representation, action and expression, and engagement.

These lesson plans also included a section of extending and refining what students learned in a lesson on that day. The participant included multiple means of action and expression during the extending and refining section in order to have students show what they knew about a new topic of their learning. Self-regulation was not supported within some aspects of the lessons such as providing clear expectations; however, there seemed to be ample opportunities for students to receive feedback on their performance.

Lesson Plan B

Lesson Plan B was a series of five lesson plans in a math unit for coins and bills for ninth grade finance class. The participant developed these lesson plans during her third semester in field-based experiences. These lesson plans included multiple means of

Table 3

Examples of UDL Application in Lesson Plan A

UDL Principles	Examples of Activities
Representation	<ul style="list-style-type: none"> • Activate prior knowledge by reading literature at the beginning of the lesson. • Provide pictorial representations throughout lessons such as for vocabularies used during instruction and representations of student research findings on a chart.
Action and Expression	<ul style="list-style-type: none"> • Provide varied modes of responses through writing sentences and drawing. • Implement an activity for sorting pictorial representations. • Have students acting out in a game of season charades for showing what they learned in the lesson. • Utilize a SMART Board™ as a display for each season during Mr. Froggy clothing activities such as selecting season appropriate clothes.
Engagement	<ul style="list-style-type: none"> • Instruct students through a nature walk outside classroom for experiencing senses of seeing, hearing, smelling, and feeling. • Provide collaborative learning opportunities as a whole class when sharing student findings. • Make connections with what students are learning to students' everyday life such as flying kites, camping, and playing baseball and softball. • Provide discussions and prompts relevant to students' life such as different activities in spring and summer, differences in the weather between spring and summer, similarities in spring and summer seasons.

representation, action and expression, and engagement. The participant who developed Lesson Plan B consistently activated students' prior knowledge and helped students make connections between what they were going to learn and their everyday life. She provided a variety of hands-on activities utilizing mock coins and bills and visual cues to help students' understanding and problem-solving processes. Some examples of these activities were listed in Table 4 for multiple means of representation, action and expression, and engagement. An assistive technology was utilized on the first day of the lesson by demonstrating how to identify coins through a projector to the whole class in a series of five lessons. Students had opportunities to continuously utilize manipulatives as guiding support for learning for the other lessons when assistive technology was not included. Items suggested by CAST (2013 d) in multiple means of representation, action and expression, and engagement were present in each of the series of five lessons. Some items such as optimizing access to tools and assistive technology, as well as multimedia for communication, were not present in a consistent manner; however, visual representations and hands-on activities were present in each lesson.

Lesson Plan C

Lesson Plan C was a series of four lesson plans on a unit of decimals in sixth grade mathematics. The participant developed these lesson plans in her fourth semester in field-based experiences. These lesson plans included multiple means from UDL principles with an emphasis on the engagement portion. Some examples included uses of different representations such as a decimal multiplication grid and visual cues for math vocabulary. As an action and expression activity, a math game and mini-whiteboard

Table 4

Examples of UDL Application in Lesson Plan B

UDL Principles	Examples of Activities
Representation	<ul style="list-style-type: none">• Provide pictures of mock coins and bills for teacher and student uses.• Provide students with the option to utilize a visual cue illustrating values for coins and bills.
Action and Expression	<ul style="list-style-type: none">• Differentiate assessment for numbers of coin to use to answer questions depending on student progress.• Provide options for students to create math problems.• Gradually withdraw manipulatives and increasing representation and abstract concepts according to student mastery.• Provide different activities in learning stations for students to engage in and solve problems and review items.
Engagement	<ul style="list-style-type: none">• Introduce and reintroduce a rationale for learning currency in math at the beginning and end of the lessons.• Make connections within the lessons to students' everyday living ("When you go home today, pick out your favorite thing in your room. Think about how much you would have to pay for that item".)• Implement collaborative learning opportunities as a whole class and in learning stations.

response system were included. Through opportunities to work with a partner, each lesson included collaborative projects. Individual choices such as an opportunity to select which multiplication card to solve with a partner was included as self-monitoring and reflection for students. Some examples of sample activities were listed in Table 5 for multiple means of representation, action and expression, and engagement. Multimedia for communication was not present in some lessons and presentation of authenticity were not presented in a consistent manner; however, these components were included in some portions of the lesson plans.

Lesson Plan D

Lesson Plan D was a series of five social studies lesson plan on a unit for immigration and migration for a fifth grade classroom. The participant developed these lesson plans in her third semester in field-based experiences. These lesson plans included multiple means of representation, action and expression, and engagement as some examples were listed in Table 6. For example, the representation piece included read-alouds modeled by a teacher using an E-book. In action and expression, students were given opportunities to select multiple media to show their understanding of a topic. By connecting a new learning topic with what students already knew and have them give examples from everyday life, the lesson became authentic and relevant for students. Having technological resources such as an iPad® and hands-on activities such as creating their own migration maps, students were given multiple modes of action and expression during learning activities. Some lessons included self-assessment and personal coping strategies during independent practices.

Table 5

Examples of UDL Application in Lesson Plan C

UDL Principles	Examples of Activities
Representation	<ul style="list-style-type: none">• Utilize a decimal multiplication grid for teacher model and guided practices.• Provide visual cues for math vocabularies.
Action and Expression	<ul style="list-style-type: none">• Have students play a math game for problem-solving fluency practices such as the Battleship Decimals game.• Have students use whiteboards to show their understanding during guided practices.
Engagement	<ul style="list-style-type: none">• Instruct students use verbal cues for problem-solving rules for students to self-check their understanding.• Provide word problems that are relevant to students' everyday life.• Have students collaboratively work with a partner to solve given math problems through discussions and playing math games.• Instruct students to utilize cards with different difficulty levels of problems to choose from for students.

Table 6

Examples of UDL Application in Lesson Plan D

UDL Principles	Examples of Activities
Representation	<ul style="list-style-type: none">• Utilize a document camera for telling stories on immigration.• Utilize a chart paper for organizing a class-wide research data.• Utilize digital books for providing teacher models.
Action and Expression	<ul style="list-style-type: none">• Provide opportunities to choose multiple media such as writing sentences, drawing pictures, and responding orally to show what students know about what they learned.• Assess student understanding through ticket out the door.• Have students utilize iPads® for group research projects.• Implement hands-on activities by having students create their own migration maps.
Engagement	<ul style="list-style-type: none">• Have students use a stress ball for taking turns to speak up.• Provide opportunities to look for examples from students' everyday life to connect to a new learning topic on immigration and migration such as a discussion of if knowing someone close to students themselves moved away.• Have students collaboratively work on projects such as a Think-Pair-Share activity.• Implement teacher-student team conference for mastery-oriented group feedback and optimizing motivation.

Lesson Plan E

Lesson Plan E was a series of fourth grade science lesson plans for a unit on the solar system. The participant developed these lesson plans in her third semester in field-based experiences. These lesson plans included multiple means of representation, action and expression, and engagement. Some of these examples were listed in Table 7. For example, as for representation, the lessons included multiple media resources on a new topic. Also, new vocabulary words were introduced auditory, visually, and literally. There were hands-on activities for students to create items they could refer back for information later as in multiple means of action and expression. Through engaging students in such hands-on activities, for example, having them play a game show, multiple means of engagement were presented in these lessons. Some elements in sustaining effort and persistence were not addressed in these lessons; however, acting out and hands-on activities to engage students were presented.

Summary

In exploring how teacher candidates perceived UDL in terms of: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL, results of the individual interviews, the focus group interview, and the lesson plan reviews were discussed in this chapter. Four participants engaged in all three aspects of the data collection: the individual interviews,

Table 7

Examples of UDL Application in Lesson Plan E

UDL Principles	Examples of Activities
Representation	<ul style="list-style-type: none">• Utilize multiple media resources on a topic at the beginning of the lesson.• Provide auditory, visually, and literally introducing new vocabularies.• Activate students' prior knowledge by providing resources for students.
Action and Expression	<ul style="list-style-type: none">• Develop an activity for creating students' own solar system mobile shadow box in class.• Have students both orally and literally respond to show their understanding of a topic.
Engagement	<ul style="list-style-type: none">• Have students create and utilize handmade manipulative resources to be made by students for students to refer back later on.• Have students create a solar system hanger in independent practice.• Have students play a game show activity as a class.

the focus group interview, and the lesson plan reviews. One of six participants engaged in both the individual interview and the focus group interview without participating in the lesson plan review by choosing to participate in the first two aspects of the study.

Another participant engaged in the lesson plan review without participating in the individual interview and the focus group interview due to health concerns at the time of this study. Through the individual interviews and the focus group interview, six themes emerged. Seventeen subthemes were identified under these themes. The prevalence of subthemes that emerged from the individual interviews and the focus group interview were illustrated in. Examples of UDL principles included in the lesson plans were listed in Table 3, 4, 5, 6, and 7.

The first theme to emerge from the individual interviews was the benefit and practicality of UDL. Subthemes derived from the first theme included (a) enduring understanding, (b) benefits of learning to develop lesson plans with UDL, (c) learner-centered approaches, (d) feasibility for implementation, and (e) technology in classroom. All participants described what UDL meant to them and the benefits of utilizing UDL principles in their teaching practices. They provided explanations of what UDL was according to CAST (2014). They described that a UDL lesson plan form helped them learn and guide their lesson plan development process to address multiple means of representation, action and expression, and engagement. Their perception of being able to develop learner-centered learning activities by following UDL principles were recurring

subtheme emerged under this theme. They also described their perceptions of practicality for implementing UDL lesson plans in their field-based experiences. The uses of technology in their field-based experiences were unique among the participants. They described an importance of connecting student needs and technological resources available at school as an element of UDL application.

The second theme to emerge from the individual interviews and the focus group interview was a dedication to building UDL competency. The participants described their consistent practices in developing lesson plans by incorporating UDL principles throughout the program. Subthemes derived from the second theme included (a) fluency building process and (b) proactively seeking opportunities for additional practices. Observing student needs in their field-based experiences helped them practice in developing UDL lesson plans based on a real-world application. The participants described how they would incorporate UDL principles into their lesson plans by providing detailed and concrete examples. They also provided explanations for their personal choices to incorporate multiple means of representation, action and expression, and engagement into their lessons. Some participants indicated how they would like to proactively seek opportunities to grow professionally through having additional practice in developing and implementing lesson plans.

The third theme to emerge from the individual interviews and the focus group interview was collegial support. Subthemes appeared from the third theme included (a) continuous training, (b) instructor support, (c) peer support, (d) cooperating teacher support, and (e) resources. Participants elucidated how their programs consistently

supported their understanding and application of UDL principles through their coursework and field-based experiences. Community-based experiences, scaffolding in the program, and simulation for lesson planning and implementation were supportive program elements suggested by the participants. They also discussed models of UDL along with direct instruction and hands-on learning experiences they received from their instructors. They indicated these instructors' models were very helpful as they continue to learn to implement and apply UDL principles. Peer support, including opportunities for collaborative learning and co-planning lessons, were indicated as helpful as they could apply to real-world teaching practices. Cooperating teacher support was also indicated as essential in the effort to deepen their enduring understanding of UDL principles and their application. Participants described electric resources as most helpful while practicing UDL principles.

The fourth theme to emerge from the individual interviews was the overcoming of challenges while advancing their competency in UDL application. Their challenges were related to improving their competency in UDL application as they constantly attempted to make professional growth in the program. Some participants suggested some activities they would like to engage for overcoming their challenges. Some other participants described their disposition to engage in more practices in field-based experiences.

The fifth theme to emerge from the individual interviews and the focus group interview was the use of advanced UDL application described by the participants. Subthemes emerged from the fourth theme were (a) fluency, (b) flexibility, and (c) instructional elements accompanied with UDL application. The participants reflected that

their fluency in utilizing UDL principles for developing lesson plans and implementing them had improved compared to when they started the program. In the focus group interview, they discussed they felt they were prepared to constantly apply UDL principles in their field-based teaching experiences. They also explained that their perceptions of their own flexibilities when they encountered unexpected events during their lesson implementation. All participants agreed that they perceived their flexibilities in automatic responses to unexpected events while still incorporating UDL principles in their responses and were well prepared. The participants also described how they learned to utilize other instructional strategies such as direct instruction, evidence-based instruction, and differentiated instruction accompanied while applying UDL principles to their teaching practices.

The sixth theme to emerge from the individual interviews and the focus group was personal commitment. The participants were asked for their perceptions of UDL application after they graduated from the program. They described that they would like to use UDL principles in their lessons in their future classrooms. Some participants explained they were very familiar with the application of UDL and its incorporation into their lesson planning. They explained that UDL principles were easy to implement and effective instructional tool for them. They indicated that they might make changes in how UDL lesson plan form was composed in order to fit in areas of teaching focuses according to student needs in their classrooms. In the focus group interview, the participants' overall conclusion of discussions in relation to UDL that their personal

choices and preferences would be to utilize UDL principles in their classroom teaching to meet student needs across settings, special education and general education classrooms.

The lesson plan reviews showed that the participants included UDL principles of multiple means of representation, action and expression, and engagement in their lesson plans. This result was consistent with the participants' descriptions regarding their understanding and application of UDL principles during the individual interviews and the focus group interview. As explained by these participants during the individual interviews and the focus group interview, these resources and activities made available in these lesson plans were individually unique as shown in Table, 3, 4, 5, 6, and 7. There were select UDL features that did not appear in some lesson plans. These features included options to optimize individuals' autonomy of learning as well as to maximize transfer and generalization of knowledge; however, the absence of these subcategories was not consistent across lesson plans.

CHAPTER V

DISCUSSION

The purpose of this study was to explore teacher candidates' perception of their understanding in Universal Design for Learning (UDL) and its core principles, as well as the application of these UDL principles to their field-based teaching experiences. UDL is founded upon three core principles: (1) multiple means of representation; (2) multiple means of action and expression; and (3) multiple means of engagement (CAST, 2014). Through the application of these UDL principles to instructional practices, teachers are able to remove preexisting barriers within the curriculum and connect student learning and interaction with the curriculum (Rose & Mayer, 2002; Orkwis & McLane, 1998). Understanding UDL principles, having ample opportunities to practice application of these principles in planning and implementation, and engaging in effective UDL training are all essential elements for teacher candidates in special and general education programs.

This study examined teacher candidates' perceptions in relation to UDL in four areas: (1) their understanding of UDL; (2) their experiences and observations in how UDL was implemented in classrooms; (3) their implementation and application of what they learned related to UDL to classroom teaching practices; and (4) their experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL. In an exploration of these four areas, this research

focused on four elements. First, the research inquired as to the understanding of UDL principles among teacher candidates in the special education: general curriculum major program and teacher candidates in the elementary education and special education: general curriculum dual major program. The second query was these teacher candidates' perceptions toward how UDL principles were implemented in classrooms as they engaged in a series of field-based experiences in the program. Third, this study investigated teacher candidates' perceptions concerning the implementation and application of their UDL training to teaching practices in field-based experiences. The final inquiry was to describe teacher candidates' perceptions toward (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges in understanding and implementing UDL principles in classroom. Table 8 illustrates relationships between research questions and emerging themes and their subthemes.

Interpretations

The result of the study indicates six emerging themes from individual interviews and a focus group interview. This highlights the participants' perception of: their understanding of UDL principles, experiences and observation of how UDL principles were applied in classrooms, implementation and application of these principles to their teaching, and experience in a system of support, resources, procedures, benefits, and challenges in a process of their learning of and performance for UDL features. These emerging themes were as follow: (1) benefits and practicality, (2) dedication to building UDL competency, (3) collegial support, (4) overcoming challenges, (5) advanced application, and (6) personal commitment. The products of the lesson plan reviews were

Table 8

Research Matrix Examining Emerging Themes and Subthemes from the Individual Interviews and the Focus Group Interview

Research Questions	TC	<i>n</i>	Themes	Subthemes	Data
1. How do teacher candidates enrolled in the major in special education: general curriculum and the dual major in elementary education and special education: general curriculum perceive their understanding of UDL?	SE EESE	3 3	Benefits and Practicality	Enduring Understanding Benefits of Learning to Develop Lesson Plans with UDL Learner-Centered Approaches	I I I
2. How do these teacher candidates perceive UDL implemented in classrooms through their field-based experiences?	SE EESE	3 3	Benefits and Practicality Collegial Support	Feasibility for Implementation Technology in Classroom Cooperating Teachers	I I I/FG
3. How do these teacher candidates perceive their implementation and application of what they learned related to UDL to classroom teaching practices?	SE EESE	3 3	Dedication to Building UDL Competency Overcoming Challenges Advanced Application	Fluency Building Process Proactively Seeking Opportunities for Additional Practices Fluency	I I/FG I I/FG
4. How do these teacher candidates perceive their experiences in (a) supports, (b) resources, (c) procedures, (d) benefits, and (e) challenges related to understanding and implementing UDL?	SE EESE	3 3	Collegial Support Advanced Application Overcoming Challenges Personal Commitment	Instructor Support, Peer Support, & Cooperating Teacher Support Resources Continuous Training Flexibility Instructional Elements with UDL	I/FG I I/FG I/FG I/FG I I/FG

Note. EESE= elementary education and special education: general curriculum; FG= focus group interview; I= individual interviews; TC= teacher candidates; SE = special education: general curriculum; UDL= Universal Design for Learning.

categorized to observe feature patterns of UDL principles as they appeared in a series of lesson plans developed by each teacher candidate. The pattern suggested constant inclusion of three UDL core principles in their lessons. Subcategorization of detailed UDL features indicated few patterns of absences in terms of including some UDL features in some lessons. Based on themes and patterns derived from remarks in interviews and snapshots of lesson plans, the following discussion describes how these six teacher candidates perceived their interpretation of acquisition and application of UDL principles through their experiences. A continuum of participants' perceptions of their understanding and implementation of UDL principles were illustrated in Figure 7 along with six themes and their subthemes identified in this study. Each of the identified themes and subthemes appeared to contribute to the development of teaching practices incorporating UDL in their learning process and was discussed in this chapter.

Understanding of UDL

The first research question in this study inquired as to how teacher candidates in who major in special education: general curriculum and the dual major in elementary education and special education: general curriculum perceive their understanding of UDL. The discussion in this section describes their perception of UDL with their enduring understanding of UDL as well as their experiences in benefits of developing UDL lesson plans, developing learner-centered instructional approaches, feasibility for UDL application, and uses of technological resources in classroom.

Understanding UDL principles is a first step to learning to remove preexisting barriers within the curriculum and bridge actions of learning among students interacting

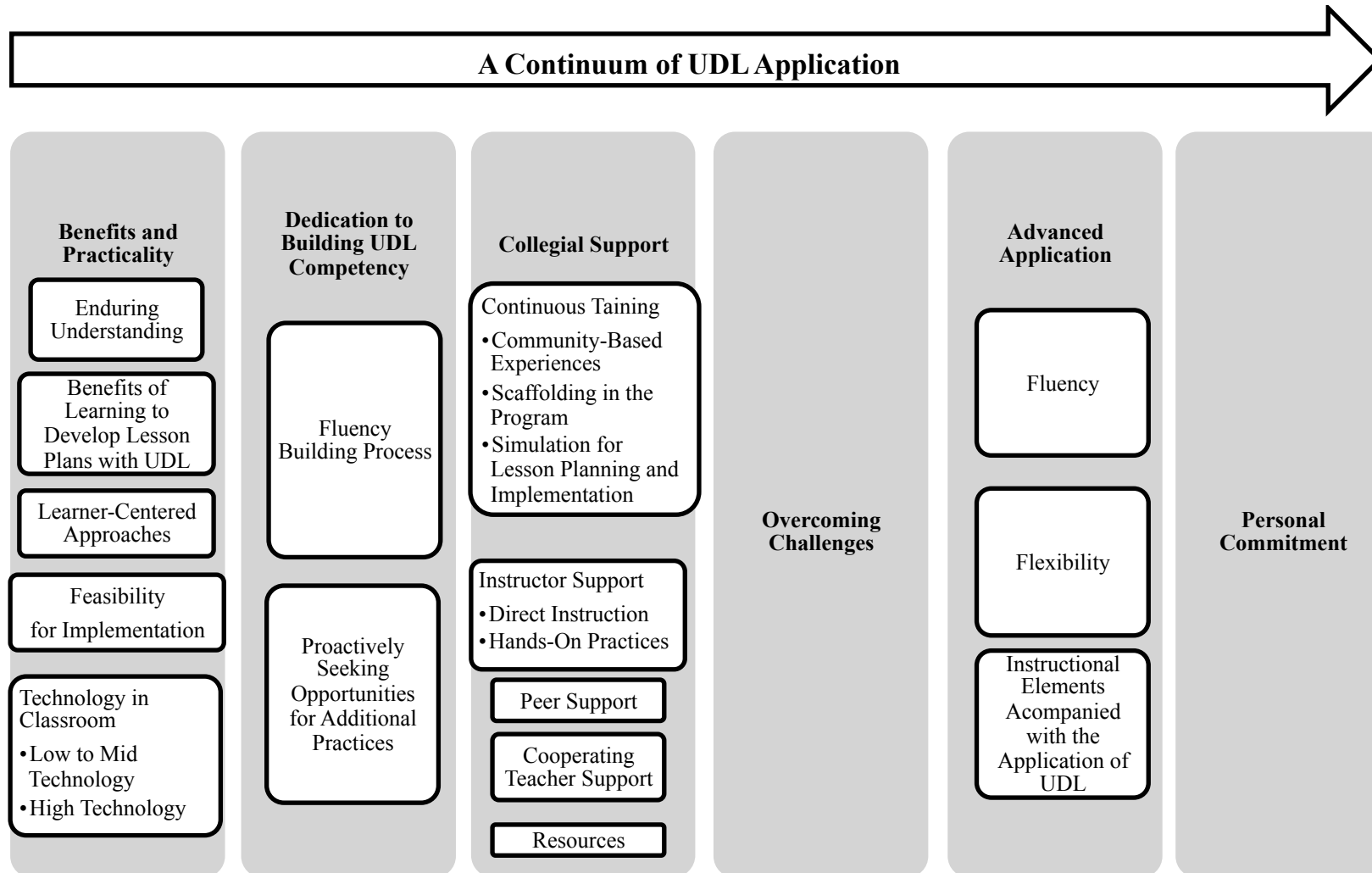


Figure 7. Map of Theme and Subtheme Relationships in the Process of Learning to Develop and Implement Lesson Plans Incorporating the Application of UDL Principles.

with the curriculum. Participants described their interpretation of UDL in accordance with CAST (2014). They explained their initial learning process of UDL in their introductory class to special education through a concept of Universal Design in architecture (Rose & Meyer, 2002, 2006; The Center for Universal Design, College of Design, North Carolina State University, 2008). They also described that in-class activities to exploring the CAST website helped them learn about UDL. The CAST website and periodical in-class discussion of UDL principles helped them refresh their precise understanding of UDL.

Participants suggested that experiencing benefits of developing lesson plans using UDL principles through coursework and field-based experiences further encouraged their enduring understanding of UDL. Utilizing a UDL lesson plan form was mentioned that it made their initial learning process in developing lesson plans easier. Built-in features in the UDL lesson plan form such as sections for multiple means of representation, action and expression, and engagement appears to reinforce participants' thought process and lesson focus in incorporating these elements in their lesson plans.

Based on participants' descriptions, conceptualization of learner-centered instructional approaches was encouraged through a concrete understanding of UDL and its anticipated implementation in lesson planning practices. It appears that planning UDL lesson plans provided participants with flexibilities in teacher actions in instruction and student actions in learning. By elaborating multiple means of representation, action and expression, and engagement in the lesson planning process, participants brainstormed a

variety of ways to introduce learning topics to students, strategies to have students demonstrate their knowledge, and activities to make learning meaningful for students.

Participants indicated that because of it was designed to be followed easily, the way participants learned to develop lessons was perceived practical to be implemented. UDL lesson plan practices that participants followed was accompanied with direct instruction and included sections such as activating strategy, I Do, We Do, You Do, in addition to sections addressing (a) unit of study, (b) grade level, (c) standards, (d) IEP objectives, (e) essential question or outcomes, (f) materials, (g) error correction, (h) summarizing strategy, (I) assessment, adaptation, (j) UDL principles, and (k) extending and refining. Participants described that utilizing the lesson plan incorporating UDL and these additional elements made following that lesson plan easier during teaching practices because of its order appeared in the form which helped them scaffolding student learning. McGuire-Schwartz and Arndt (2007) suggest a small number of lesson plan models that are applicable to addressing UDL principles; however, participants in this study appeared to favor their UDL lesson plan form which they had been utilizing in their program.

From participants' explanation of their experiences, it was indicated that the availability of technological teaching tools varied across classrooms in their field experiences, and participants had unique experiences in utilizing technology through field-based experiences. Through these experiences, it was suggested they learned ways to connect what was available in classroom in terms of technology with how student learning could be optimized. By experiencing varied availability of technology in

different classrooms, participants expressed that they observed benefits of technological resources such as the use of SMART Boards™, iPads®, and i>Clickers™ to pencil grips and giant erasers. These technological teaching tools incorporated UDL experiences and appeared to develop participants' interpretation of technology as a tool to make lessons more interactive, fun, and efficient.

UDL Implementation in Classroom

The second research question addressed teacher candidates' interpretation of how they observed UDL as it was implemented in classrooms through their field-based experiences. By working with cooperating teachers in their series of field-based experiences, participants had opportunities to observe how UDL was implemented in real classrooms. In field-based experiences, they could observe and practice UDL application by working with special education and general education cooperating teachers. These observations and practices in the field appeared to help them understand how teachers and students would maximize momentum of teaching and learning when UDL was implemented. This experience in actual classrooms might have assisted them in making connections between what they learned in their methods and field-experience courses in the program with how it would look like in actual classrooms. These connections seemed to be meaningful for teacher candidates as they constantly looked for opportunities in real-world application of what they learned in their programs to outside application as it relates to their courses.

Implementation and Application to Teaching Practices

The third research question focused on ways that teacher candidates perceived their UDL implementation and application to their teaching practices in field-based experiences. The importance of practicing to implement lesson plans they developed was recurrently mentioned by participants. It was suggested by participants that in lesson plan implementation, participants made improvements in their UDL lesson planning fluency by learning from their self-reflection of success and challenges, as well as feedback from supervisors and cooperating teachers. This corresponds to findings of the research conducted by McGuire-Schwartz and Arndt (2007). This reflective learning cycle is suggested by Meo (2008) as an essential component for teachers to learn to apply UDL principles to teaching content areas through a professional development project.

Having field-based experiences appeared to make lesson planning practices authentic for teacher candidates. Participants indicated that by thinking of student needs they observed in their field-based experiences, it made it easier for them to practice in planning lessons with realistic activities incorporating UDL principles. In this process, they visualized how they would utilize newly acquired teaching methods to fulfill needs of students in a real classroom. Although case studies in coursework also appears to be helpful when practicing to develop lesson plans, having real classroom experiences is suggested to being even more beneficial and practical to make UDL application feasible. Actual implementation of these lesson plans seemed to encourage the participants to make action plans to improve their lesson development and application performance. Even when some elements of UDL lesson plans they developed did not work as they

planned, they self-reflected and sought feedback from supervisors and cooperating teachers to plan for improving their lessons. Participants indicated that they began understanding that UDL lessons might not work all the time. Meo (2008) points out the importance of this realization among teachers that UDL does not imply a one-size-fits-all for all learners. Actions of implementing lesson plans that they developed appeared to help them build fluency in planning lessons, applying UDL principles, and teaching students. Spooner et al. (2007) suggests this skill in fluently building lesson plans with UDL principles is an essential UDL training outcome.

Experiences in the Acquisition and Application Process

The fourth question was centered on experiences in (a) support, (b) resources, (c) procedures, (d) benefits, and (e) challenges perceived by the teacher candidates in relation to understanding and implementing what they learned about UDL. Participants suggested that throughout learning experiences in the program, they engaged in a variety of opportunities for applying UDL principles to teaching practices. These learning experiences were supported by their instructors, peers, and cooperating teachers. In this support system, participants located UDL related resources. It appeared that the more they gained hands-on experiences in UDL, the more experience they gained observing benefits of UDL implementation in classroom. There seemed to be some challenges to overcome among participants in terms of building proficiency in utilizing the principles of UDL. However, they developed their action plans as they located their support system in the program.

Participants indicated that a series of field-based experiences was a helpful feature of the program as they became familiar with classroom teaching at the beginning and used it to as they demonstrated what they learned in the program in classrooms as they gained experiences in classroom. For example, in the beginning they had opportunities to observe their cooperating teachers and take over a small portion of classroom instruction with supervision from university supervisors and cooperating teachers. Participants suggested that a gradual process of taking teaching responsibilities with supervision through a series of field-based experiences helped them develop their confidence and fluency in building lesson plans and teaching these lesson plans in classroom.

Support. Participants indicated they developed a learning support system in the program. This support system included their instructors, peers, and cooperating teachers. For example, participants appeared to perceive frequent and continuous feedback from instructors in their lesson planning practices as helpful. They described that their instructors' feedback helped them pinpoint ways to improve their lessons over time. This process involved making numerous revisions for UDL lesson plans that developed through extensive instructor feedback. It was suggested by participants that in the beginning, they learned to develop lesson plans with UDL principles, and as they progressed in the program, they moved from learning to develop lesson plans to learning to effectively incorporate UDL principles into their lesson plans. This process appeared to help them make steady growth in UDL application practices.

Instructor support. Direct instruction modeled by instructors was suggested also as helpful for participants to observe and experience how they were supposed to

implement their UDL lesson plans through direct instruction. By having the instructor models while participants were taking their courses, they indicated they experienced a real-world application of UDL lessons and gained perspective of students having this type of instruction in classroom. In direct instruction, participants seemed to gain insights on how they would implement their lessons through providing teacher models, guided practices, and independent practices to students. It appears that direct instruction and scaffolding practices for teacher candidates during their training on UDL application help them gradually develop their fluency in utilizing UDL principles.

Peer support. Collaborative practice is essential for teachers as they have numerous opportunities and obligations to work with their colleagues at school. Participants suggested that they were able to practice collaboration with their peers in the program. In the development of UDL lesson plans, they had opportunities to co-plan lessons, ask their peers for feedback, and share resources in relation to UDL. It was suggested that the program was perceived as collaborative and this would help them prepare for their future practices in collaboration and co-teaching after they graduated from the program.

Cooperating teacher support. Participants spent required field-based experience hours in the program. For their course projects, they sometimes spent additional hours in their field-based experiences. Participants indicated that support from cooperating teachers in the process of learning to develop lessons and the application of UDL principles was consistent. It appeared that participants located UDL-related instructional resources from their cooperating teachers that were timely and applicable for students in

classroom with whom they were working in field-based experiences. Working with cooperating teachers might have encouraged participants to gain insight on what they learned in methods courses, as they were able to experience how these methods would be applied to real classrooms in first hand.

Resources. Ample and easy to locate resources for learners help them deepen their enduring understanding and develop fluency when utilizing their knowledge. Participants explained that personal and online resources were most helpful. For instance, as they developed a support system with their instructors, peers, and cooperating teachers, they seemed to seek resources related to teaching and learning through their support system. This indicated they might have a community of learning support in their process of learning UDL. Participants also indicated that online resources were helpful in a way that made easy and quick to locate what they were looking for in terms of clarifying their understanding and locating relevant teaching strategies related to UDL. It appeared that they repeatedly went back to the CAST (2014) website to refresh their knowledge and locate additional resources.

Procedures. Continuous training in UDL principles and its application was suggested by participants to be helpful as they gained hands-on experiences, built confidence in utilizing the principles, and developed fluency in UDL instructional application. For example, engaging in inclusive community-based experiences in learning to locate resources for learners with disabilities was one of many helpful experiences identified by the participants to apply UDL principles for building an inclusive learning community. Another UDL training element mentioned by participants as a helpful

experience was its scaffolding learning process. Participants indicated that a series of field-based experiences proved to be a helpful feature of the program as they became familiar with classroom teaching at the beginning and used it while learning to demonstrate what they learned in the program as they gained experiences in classroom. For example, in the beginning they had opportunities to observe their cooperating teachers and take over a small portion of classroom instruction with supervision from university supervisors and cooperating teachers. Participants suggested that a gradual process of taking teaching responsibilities with supervision through a series of field-based experiences helped them develop their confidence and fluency in building lesson plans and teaching these lesson plans in the classroom. Having a teaching simulation in a classroom was mentioned by participants as a helpful learning practice with peer support in classroom. Based on participants' indications on the topic of the program support, it appears that having authentic teaching experiences were an essential element when learning to incorporate UDL principles into their teaching and reflections on their teaching practices.

Benefits. Participants' perceptions of benefits in relation to understanding and implementing UDL appeared to be consistent in their shared experiences and reviews of lesson plans in this study. In their UDL lesson plans, several hands-on activities, rather than paper and pencil worksheets, were incorporated as they appeared to enhance multiple means of representation, action and expression, and engagement. This finding differed from what Courey et al. (2012) suggests as a result of their study on the effect of a three-hour UDL training session. This may be due to the fact that participants had

extensive UDL training throughout their program in this study. It was suggested by participants that their experiences in applying UDL principles into a variety of classroom settings through their field-based experiences widened their views of the benefits of UDL. They described their experiences in the development of student-centered lesson plans by utilizing UDL principles and their benefits through built-in UDL features for optimizing student learning and instructional activities. This experience is consistent with findings from Orkwis & McLane (1998) in terms of efficient and economical teaching practices through UDL for reaching a wide range of learning styles. They indicated there were clear expectations that would incorporate UDL principles into their lessons regardless of course topics. For example, they learned to locate and utilize evidence-based practices and practice direct instruction throughout their program experience. This teacher candidates' perceptions of experiences in observing benefits of UDL application for students also was consistent with a finding from a study conducted by McGuire-Schwartz and Arndt (2007) on examining how senior teacher candidates understood and applied UDL principles to lesson planning among undergraduate students. Ample teaching practices through ongoing training, accompanied with consistent expectation of UDL application, may encourage teacher candidates to gain experience in the benefits of understanding and implementing UDL.

Overcoming challenges. In the process of understanding and implementing UDL principles, although they appeared to have a support system and resources, there seemed to be challenges among participants to overcome. They indicated that as they attempted to constantly improve their proficiency in utilizing UDL principles, they experienced a

challenge in particular aspects of their application. As they had a wide variety of learning styles among students in their field-based experiences, it appeared they sometimes had overwhelming ideas of how they would incorporate numerous opportunities for representation, action and expression, and engagement, when they thought for individualized instruction. This challenge is also suggested by Sapp (2009) in providing general education curriculum access to a wide range of learners with varied learning abilities. In addition, Meo (2008) suggests this experience in focusing on individualized instruction while utilizing UDL principles might be due to UDL features that encourage teachers to look into individual learning differences. It seemed that participants were gradually overcoming their challenges to optimizing UDL application as they gained experiences in classrooms through field-based experiences.

Personal Commitment

Participants projected they would continue to utilize UDL principles in their student teaching and after their graduation from the program. As described earlier, they engaged in a series of field-based experiences incorporating UDL in classroom. This continuing UDL training may have helped them to incorporate application of UDL into their ordinary and anticipated teaching practices. They appeared to consistently involve UDL principles into their lesson plans according to student needs and content area for which they planned lessons. In such practices, the UDL training appears to encourage participants' fluency building by applying what they learned in courses in relation to UDL principles as to how they teach in real classroom.

Conclusions

This study supported the following: (1) an enduring understanding of UDL among teacher candidates is developed through constant reinforcement in coursework and field-based experiences after an initial introduction to its principles; (2) their collegial support system is a central key element of learning to develop and implement UDL lessons and constantly self-reflecting their UDL practices; and (3) a series of field-based experiences incorporating UDL supports their skill and confidence building in teaching practices.

Implications for UDL Training

An application of UDL principles can make general education curriculum accessible to as wide an extent of learners as possible (Kurtts et al., 2009; Meo, 2008). The effectiveness of UDL training has been studied by researchers in the field of education. This study focused on teacher candidates' perceptions toward their understanding, implementation, and application of UDL principles, as well as their perceptions of the learning process to accomplish these skills. The program structure and its support system for teacher candidates learning to incorporate UDL principles can be an influential key component that encourages them to continuously build up their fluency when applying these principles to their field-based experiences. As Edyburn (2010) suggests, before concluding UDL training effects on generalization, the complexities of interaction among influential factors such as learning objectives, characteristics, support, technology, and outcome must be considered.

First, the UDL lesson plan form reinforcing uses of UDL principles along with direct instruction can be easy to follow when it comes to planning UDL lessons and

teaching these lessons in classroom. However, as addressed in this study, simply utilizing this lesson plan form for training teacher candidates on the application of UDL may not be as practical. The use of this lesson plan form was introduced in their first field-based experience, and practices to incorporate UDL principles by using this lesson plan form were carried out throughout their following semesters through scaffolding. The elements in this lesson plan were constantly modeled by instructors, practiced with guidance, and independently implemented by teacher candidates. Frequent feedback on their performance in UDL application is an essential element to improve their use of UDL principles and UDL lesson plans.

Second, there was a variety of learning opportunities outside coursework such as inclusive community-based projects and field-based experiences. Offering these opportunities to teacher candidates can complement what they learned in coursework during application of their knowledge to the field practices. These learning opportunities appeared to be aligned with their coursework addressing UDL principles and carefully chosen to meet their learning objectives. It is essential for teacher educators to plan for weaving interactions between learning objectives across coursework and learning opportunities in the community as well as in the field.

Third, technological resources are an essential piece of UDL principles for maximizing student learning. Learning to use new strategies with or without technology will take time to build fluency when utilizing them and making them as one's own. It is expected that building proficiency when utilizing UDL principles including technology takes time for to master. Hands-on activities incorporating technology may need to be

constantly reinforced through coursework and field-experiences so that teacher candidates will be able to naturally incorporate this element of UDL into their teaching practices.

Fourth, scaffolding experiences were carefully developed in the program for teacher candidates to practice utilizing UDL principles. Through coursework and field experiences, they engaged in a series of teaching practices in UDL. Teacher candidates' experiences in the process of learning to incorporate UDL into instruction can be unique due to their background and field practices. Concepts learners take away from what they were presented may vary according to their experiences and perceptions. For example, some teacher candidates voluntarily spent additional hours in field-experiences outside of program requirements. These additional experiences in the field may enhance their progress in acquiring and demonstrating UDL principles.

In the field of education, there are needs for teacher preparation programs to train teacher candidates for the use of UDL principles in their lesson planning (Spooner et al. (2007) while having these additional learning experiences during UDL training. This study suggests that a series of hands-on experiences in the field provides authentic application practices to incorporate UDL in their teaching. This will also encourage them to self-reflect upon their actual implementation with feedback from their university supervisors, peers, and cooperating teachers. This learning cycle, in addition to UDL training in courses, may provide a comprehensive practice for teacher candidates in the process of acquisition and application of UDL principles.

Recommendations

This phenomenological study with six teacher candidates majored in the special education: general curriculum and the dual major in elementary education and special education: general curriculum may add an insight into effective ways that training teacher candidates learn to acquire and apply UDL principles to their teaching practices. Further research is needed to investigate the complexities of interactions between these teacher candidates' prior experiences, opportunities through which they learn to incorporate UDL to their lessons, and additional practices that they may engage in during UDL training. Future research on UDL training among teacher candidates needs to address classroom observations of their actual performance on the implementation of UDL principles in their instruction as well as a longitudinal study observing the long-term effects of UDL training on their teaching practices after they graduate from the program.

In this study, there were several concerns that need to be addressed in future research. This study did not address classroom observations although field-based experiences in practicing lesson implementation were an essential element of learning when utilizing UDL principles. Although ways that participants would implement their lesson plans were described through the individual interviews and the focus group, having classroom observations might have added further insight into how they would teach UDL lessons in classroom and what aspects of UDL principles they would emphasize in their teaching practices (Courey et al., 2012). Classroom observations are vital for providing feedback for teacher candidates, and this element needs to be included

to comprehensively observe teacher candidates' perceptions of their understanding, implementation, and application of what they learned through training.

Perhaps another element to be considered in this study was a small number of samples. The phenomenological study enables researchers to observe experiences among a group of individuals who share phenomena. In this study, the shared phenomenon was the participation in teacher preparation programs that focused on UDL training. A larger sample may add wider views of teacher candidates' unique perspectives and experiences, and may also generate the focus group interview in different dynamics.

Another implication was to have all participants engage in every aspect of the study. Four participants out of a total of six engaged in all of the study components: the individual interviews, the focus group, and the lesson plan reviews. For instance, Participant 5 engaged in the individual interview and the focus group interview without participating in the lesson plan review by her choice to engage in the first two components of this study. Participant 6 engaged in the lesson plan review. However, the participant did not engage in the individual interview and the focus group interview due to health concerns at the time of the study. Even distributions of participation in the study may have further enriched the meanings of themes and patterns.

In this study, participants were identified as one sample group as they shared their experiences in a university teacher preparation program in the Southeastern United States. Thus their shared phenomenon was the enrollment in this teacher preparation program. In future research, grouping these participants based on their major in special education: general curriculum and the dual major in elementary education and special

education: general curriculum may inform researchers of unique perspectives toward UDL based on participants' educational backgrounds. It may also identify differences and similarities in these teacher candidates' perspectives toward their understanding and application of UDL principles. In this way, a more detailed agenda of teacher preparation for UDL may be identified based on teacher candidates' educational backgrounds and teaching areas.

Observing students applying knowledge and skills derived from lessons being taught and training being provided is rewarding for both teachers and students. It is challenging to untie the complexities of learning because they also add meanings to individuals in different ways and affect what they take away from their educational experiences. Understanding ways that teacher candidates best learn UDL principles and apply them in their teaching practices will be a continuous effort among teacher educators, because being a teacher also means being a life-long learner.

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APPENDIX A

OPEN-ENDED INTERVIEW QUESTIONS

Open-Ended Interview Questions

Project Title: Universal Design for Learning with Teacher Candidates in Special Education: General Curriculum and the Dual Major in Elementary Education and Special Education: General Curriculum.

Principal Investigator: Natsuko Takemae

Faculty Advisor: Dr. Stephanie Kurtts

1. Describe what you know about Universal Design for Learning (UDL).
 - a. What did you learn in your classes?
 - b. What did you learn about UDL?
 - c. What did you learn about other ways to teach (content area)?
2. Describe your experience while learning to design lessons incorporating UDL in the program.
 - a. What was it like?
 - b. What did you do?
 - c. What did you find useful as opposed to what may have been challenging?
 - d. What else can you tell me about your learning process in the application of UDL principles through the program?
3. Describe your lessons incorporating UDL.
 - a. What are they like?
 - b. What do you do?
 - c. What are the benefits and the challenges?
 - d. What else can you tell me about designing your lessons incorporating the UDL principles?
4. Describe how you teach (content area) lessons with the application of UDL principles.
5. Which types of technology do you use to increase access to general education curriculum for students with high incidence disabilities and their typically developing peers?
6. Describe how you and your cooperating teachers have been working together to implement UDL.

7. Describe connections with your methods classes to your field-based experiences in regards to designing and implementation of the application of UDL principles.
8. What parts of your educational experiences were most helpful in order to learn the application of UDL principles? Why?
9. What changes can be made to improve the quality and effectiveness of the learning process in relation to the application of UDL principles?
10. What are some areas to be improved upon and addressed in the process of learning to develop and implement lesson plans incorporating the UDL principles?
11. What else can you tell me about your experience as you learned to apply UDL?
12. Other questions that emerge from interviews and across the project.

APPENDIX B

FOCUS GROUP INTERVIEW QUESTIONS

FOCUS GROUP INTERVIEW QUESTIONS

Project Title: Universal Design for Learning with Teacher Candidates in Special Education: General Curriculum and the Dual Major in Elementary Education and Special Education: General Curriculum.

Principal Investigator: Natsuko Takemae

Faculty Advisor: Dr. Stephanie Kurtts

Confidentiality for participants will be ensured by not identifying them by name during the audiotape focus group and individual interviews. For an additional protection of confidentiality, the participants are asked to keep what is discussed in the focus group and undisclosed and confidential.

1. Why did you choose to major in the program?
2. Please tell to me about your experience in the program.
3. Please tell to me about your field-based experiences.
4. What aspects of educational experiences in the program have been most beneficial to you as a teacher candidate?
5. How have your educational experiences in the program prepared you to become a teacher who can implement the Universal Design for Learning (UDL) principles across curriculum?
6. How have your educational experiences in the program prepared you to use the UDL principles as a framework for instruction?
7. How have your educational experiences in the program been helpful in order to learn about UDL and its use in your internship sites?
8. Describe connections with your methods classes to field experiences in terms of the development and implementation of UDL lessons plans.
9. What changes can be made to improve the quality and effectiveness of the learning process in relation to the application of UDL principles?

10. What are some areas to be improved upon and addressed in the process of learning to develop and implement lesson plans incorporating the UDL principles?
11. What else can you tell me about your experience as you learned to apply UDL?
12. Other questions that emerge from interviews and across the project.

APPENDIX C

LESSON PLAN REVIEW PROTOCOL

Lesson Plan Review Protocol

Participant: _____	Time: _____	Date: _____
Classroom: _____	Grade Level: _____	Book: _____
Day of	Lesson Plan: Y N	Group Size: _____
Week/Unit: _____		

Before Lesson: (events, time periods, actors, goals, feelings, places, objects, acts, activities)

During Lesson: (events, time periods, actors, goals, feelings, places, objects, acts, activities)

After Lesson: (events, time periods, actors, goals, feelings, places, objects, acts, activities)

* these blank sections will be expanded (spatially) for additional notes